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ABSTRACT

This guide was developed for use in grades K-6 as an enrichment program based on clarifying values. The program, designed by teachers, aims to develop in the student a greater awareness and understanding of the community, themselves, and the earth. The program includes environmental encounters and a chart of topical themes and conceptual themes. Topical themes lead teachers and students through main areas of awareness: Plants and Animals, Water, Air, Energy, Natural Resources, Land Use and Aesthetics, and Pollution. The conceptual schemes under each area of awareness increase in complexity according to the development level of the students. The activities in the encounters are action-oriented, student-centered activities which provide "hands-on" learning experiences. Each encounter provides background information, behavioral objectives, activities, a resource reference listing, and value clarification strategies. Value clarification strategies are included because the development of attitudes and a lifestyle compatible to the natural environment is related to environmental awareness, understanding, decision-making, and action. Instructions for use of the value clarification strategies contained in the program are included. (TK)

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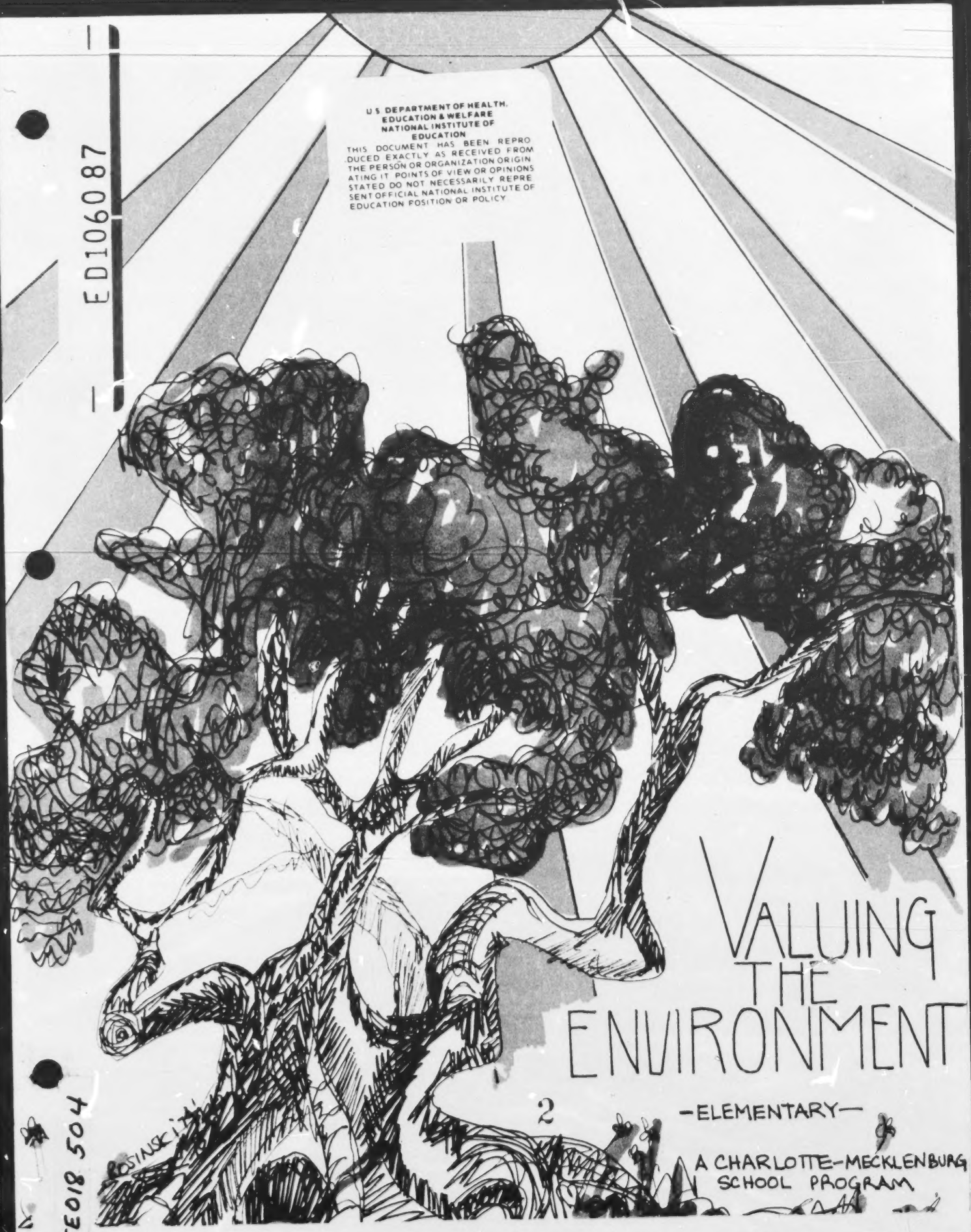


VALUING THE ENVIRONMENT

2

-ELEMENTARY-

A CHARLOTTE-MECKLENBURG SCHOOL PROGRAM

SE018 504

Project Director

S. D. Wallin

Project Coordinator

Charles T. Vizzini

Contributing Writers

Elizabeth T. Boyd
Mildred H. Brinkley
Patricia Davidson
Eileen H. Davis
Alleine G. Echerd
Daisy T. Garvin
Mary L. Gilmer
Mary Leslie Huntley
Jane H. Lewis
Margaret Ann McLauchlin
Mary Jean Rollins
Lucille H. Thomas

Consultant

Mary Dawn Liston

funded by
Project SEED
State Experimentation in Educational Development
Division of Development
N.C. Department of Public Instruction

Contents

What's It All About?

Topical Themes and
Conceptual Schemes

Environmental Encounters:

I. GIVE AND TAKE--
"Feathered Friends"
"Animals Depend on Plants"
"Natural Foods"
"Interdependence of Living Things"

II. LIQUID LIFE--
"Muddy Raindrops"
"Waste Water Treatment"
"Dirty Water"

III. AIR TODAY--GONE TOMORROW--
"Something's In The Air"
"Air Today--Gone Tomorrow"

IV. GO POWER--
"Power To Spare"
"Energy Conservation"
"Fuel As Energy"

V. TREASURES OF OUR EARTH--
"Trees"
"Pollution Is Wasteful"
"Awareness of Natural vs. Man-Made Environment"
"Urban Soil: Use and Misuse"
"Recycling--Running In Circles"

VI. MIRROR OF VALUES--
"Bicycle As If Your Life Depended On It"
"A City Desert or Oasis"
"Urban Sprawl: Effect on Vegetation"

VII. GOOD AND BAD--
"Wow! That's Deafening"
"Aesthetic Awareness of Water Pollution"
"Wanted: Loud or Soft"

WHAT'S IT ALL ABOUT?

"Valuing the Environment" is an invitation to learning in and about the environment. It is an enrichment program based on clarifying values. It is not a new course. Rather it is an interdisciplinary program which complements the existing curriculum. It was designed by teachers to help students, K-6, develop an awareness and better understanding of the community, themselves, and the spaceship earth.

Program packets include: Environmental Encounters, grouped grades K-2, 3-4, and 5-6, and a chart of Topical Themes and Conceptual Schemes. Topical Themes lead teachers and students through seven main areas of awareness: "Plants and Animals," "Water," "Air," "Energy," "Natural Resources," "Land Use," and "Aesthetics and Pollution." Conceptual Schemes under each area of awareness increase in complexity according to the development level of the students. However, teachers are encouraged to use materials from all grade levels if it seems appropriate. Flexibility is a key to the program.

Environmental Encounters are action-oriented, student-centered activities, which provide "hands-on" learning experiences for students in the classroom, on the school grounds, or in the nearby community. Environmental Encounters encourage students to consider alternative solutions to environmental problems. Each encounter provides background information for the teacher, behavioral objectives and activities, values clarification strategies and a resource reference listing.

Values Clarification strategies are interwoven into the program because development of attitudes and a lifestyle compatible with the natural environment is not only related to awareness and understanding of environmental issues, but it is also related to daily decision-making and action.

As future citizens, students of today will be asked to make decisions in the market place, in the home, in the voting booth and in the business world which will have an impact on environmental quality. "Valuing the Environment" introduces students and teachers to some of these choices--choices about everyday events which affect environmental quality.

When using the values clarification strategies, teachers are urged to encourage an atmosphere of openness, acceptance and respect. If students sense that something they value is going to be frowned upon, they will not want to share their feelings.

If a student does not want to respond, the student should be allowed to pass--with respect! Whenever possible, the teacher should participate. However, it is best for the teacher to express his or her view toward the end, so as not to influence student choices.

Instructions on major values clarification strategies used in the program follow. Further information on values clarification and full explanations of each strategy appear in Values Clarification, A Handbook of Practical Strategies for Teachers and Students by Simon, Howe and Kirschenbaum.

1. Continuum
   The teacher draws a long line on the board. The teacher and the class determine two polar positions on an issue. The positions are placed at the opposite ends of the line, and a series of points are marked along the continuum. The teacher whips around the room, asking students to tell where they stand on the issue, briefly describing the position. After five to ten students respond, everyone determines his or her own position. Followed by a free-wheeling position.
2. Alternatives Search
   The teacher states a value-laden problem such as "ways to save energy" or "things to do to improve the playground environment," and asks students to individually brain-storm alternative solutions to the problem (three to five minutes). Students then, in groups of three or four, combine individual lists, add new solutions, and choose the three alternatives they like best and rank order these (in about ten minutes). Groups report results to the class.
3. Values Wheel
   Teacher reads a percentage question, asking students to record their answers on an individual circle which they divide into pie-shaped segments representing the relative strength of their answers. Each student chooses a partner and discusses the reasons for the valuation

(approximately two minutes).

4. Values Auction
   Items listed are to be sold at an auction to the highest bidder, according to the following rules. You are to pretend that you have none of the items listed, you have a total of $5,000 to spend and that you can spend no more than $2,500 on any one item. Bids must open at no less than $50 and no more than $500, and must proceed by increments of no less than $50 and no more than $100.
5. Role Playing
   An environmental issue is described and students assume roles of individuals who are seeking solutions to the problem.
6. Values Grid
   List some general issues, such as water pollution or population control. Next to the issue students privately write a few key words to summarize their position on each issue. The teacher reads the following questions:
   1. Are you proud of (do you prize or cherish) your position?
   2. Have you publicly affirmed your position?
   3. Have you chosen your position from alternatives?
   4. Have you chosen your position after thoughtful consideration of the pros and cons and consequences?
   5. Have you chosen your position freely?
   6. Have you acted on or done anything about your beliefs?
   7. Have you acted with repetition, pattern or consistency on this issue?

   For each issue, students check the appropriate box if they can answer the question affirmatively.
7. Values Voting
   After each question is read, the students take a position by a show of hands. Affirmative, hands up; negative, hands down. The undecided fold their arms. Discussion is tabled until all questions have been completed.
8. Rank Order
   Teacher presents three or four alternative choices for responding to each question (generally written on the board), and asks students to rank order the choices, on paper, according to their own preferences. Teachers call on six or eight students to give their rankings. Discussion follows.

Pre-post tests have been developed by teachers that will measure conceptual knowledge and values judgement. Contact the Environmental Education Center at the Charlotte Nature Museum, 1658 Sterling Road, Charlotte, N. C. 28209, 704-333-0506. In addition to the testing an attitudinal inventory is available from the same source that can be used with students or parents.

Sixth grade students may participate in a planetarium program, "Viewing the Earth from Space," as a culminating activity and a sequential part of the planetarium usage.

VALUING THE ENVIRONMENT

		Topical Themes						
Grade Level		PLANTS AND ANIMALS: Give and Take	WATER: Liquid Life	AIR: Air Today -- Gone Tomorrow	ENERGY: Go Power	NATURAL RESOURCES: Treasures of Our Earth	LAND USE: Mirror of Values	AESTHETICS AND POLLUTION: Good and Bad
1-2	Conceptual Schemes	Living things are interdependent.	Water is vital to all living things.	Almost all living things need air.	Energy means power.	People depend on the earth's resources.	Earth has the capacity to support many changing environments.	What is pleasing and what is not?
3-4		Interdepency of living things involves the natural and man-made environment.	Water can change the earth's land surface.	Air is a necessity of the living and non-living.	Waste not-want not.	Abuse and misuse has led to environmental degradation.	The use of land is determined by people's values.	Man has the ability to manipulate and change the environment.
5-6		Unplanned growth affects the balance of nature.	Man must learn the wise reuse of water.	Man is his own worst enemy.	Energy is the central force in the patterns and cycles of living and non-living	Man's survival depends on his wise use and management of the resources in his environment.	Environmental quality should be the guide for community development.	Conflicts emerge between private land use and environmental quality for the public.

FEATHERED FRIENDS

Grades I and 2

I. INTRODUCTION

As man alters the land, builds homes, schools, roads and shopping centers, natural areas are disturbed, destroyed and replaced by urbanization. Habitats suitable for most animal life disappear....followed by the disappearance of the animals themselves.

Birds, being highly mobile, can continue to live with man, if suitable shelter and food remain. An understanding of bird habits, habitats, and beneficial contributions to man is important, if individuals are going to continue to enjoy urban bird populations.

It is important for children to have a basic understanding of the birdlife found in their community so that they can appreciate not only the birds aesthetic beauty, but the beneficial aspects as well. Likewise students should realize that man has the ability to alter his environment, and not always for the benefit of other living things.

II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the conclusion of a successful encounter, the children should be able to:

1. Recognize at least ten birds in the community.
2. Know the feeding habits of these ten birds.
3. Know the nesting habits of most birds.
4. Realize that wooded areas are necessary for nesting and gathering of food.

B. Activities:

1. Take a field walk in the areas around the school (try to include woods with underbrush, cleared woods, and open fields).
2. Observe and listen to the bird activity.
3. Discuss where birds were found and identify.
4. Research the type of food needed and where homes are found for each type of bird.
5. Assimilate data and discuss with the children the problems that have been discovered and also possible solutions.

	Wooded Area	Woods with Brush	Field Area
Types			
Food			
Homes			
Number Found			

6. Evaluate and adopt a workable solution that can be done by the children. (e.g. feeders and bird houses)

III. VALUES CLARIFICATION

A. Values Voting:

1. How many of you would live in an area that had no birds?
2. How many of you think planting trees would help our birds?
3. How many of you would give up your playground area to plant trees for the birds?

B. Values Continuum:

1. Where would you place yourself in the following:

Clear underbrush for play area — Leave it alone for birds and wildlife

2. Leave cleared wooded area for play — Plant more bushes to attract more birds

IV. RESOURCES

Filmstrips:

"Birds of Our Community", Society for Visual Education.
"Bird and Animal Babies:, Society for Visual Education.
"Birds That Live Near People", Society for Visual Education.
"Looking at Birds", Society for Visual Education.
"Birds", Society for Visual Education.

Study Prints:

Birds, Society for Visual Education.

Book:

Birds of North Carolina, Thomas Gilbert Pearson.

Films:

"Birds in Winter", 11 minutes, black and white, Ency. Brit.
"Bird Homes", 11 minutes, Ency. Brit.
"Life Story of the Hummingbird", color, 16 minutes, Ency. Brit.
"Life Story of the Red Wing Blackbird", color, 16 minutes, Ency. Brit.
"Robin Red Breast", black and white, 11 minutes, Coronet Edu. Films.
"Ruby Throated Hummingbird", color 8 minutes, Coronet Edu. Films.

ANIMALS DEPEND ON PLANTS

Grades 3 and 4

I. INTRODUCTION

All animals depend on the living as well as the non-living environment for survival. An animal's habitat is where it finds in the environment the "essentials of survival"--water, food, cover and a place to raise its young. For many animals, plants provide three of the four essentials of survival. Plants provide animals with food, cover, and a place to reproduce. But plants also need animals. We call this mutual dependence or interdependence.

Man's activities, by greatly affecting urban vegetation, limit habitat diversity available to animals in the city. The clearing of underbrush, paving of fields, stripping the land of trees, polluting the air, all alter animal habitats. When green areas are altered, animals which depend on that area for food, shelter, and water, must migrate or die.

Mammals and birds in the city may be grouped into three broad categories: (1) those species adapted to life with man and at least partly dependent upon him for food, cover and nesting sites, (2) those that tolerate man and (3) those that shun man; i.e., the forest, grassland and desert species for which small units of habitat available in the city are usually inadequate.

Birds adapted to a life dependent on man are the pigeon, starling, English sparrow, nighthawk, chimney swift, and herring gull. Mammals include Norway rats, house mice, cats and dogs. However, a far greater number of vertebrates "tolerate" man and take advantage of man's activities, including farming activities. This group includes the blue jay, robin, woodpecker, cardinal, crow, grackel, flicker, meadowlark, gray fox, and opossum.

Except for pests such as the rat, house mouse, and the English sparrow, little study has been devoted to the behavior of animals and birds in the city.

The starling, a pesty bird from Europe, requires the same habitat as the bluebird. Because the starling finds it easier to adapt to man's activities, bluebirds are rare in cities. The bluebird is being severely threatened.

Because animals are interdependent, severely reducing the number of one species of animal can affect the population of another with serious results. Cats in a South American town were killed because they were disease carriers. The result: proliferation of the rat population which carried even more serious diseases.

Because of this interdependence, the diversity of wildlife in the city is important to avoid calamity. Home owners, industrial firms and city governments can consciously provide the vegetation needed for food and shelter for wildlife. There can be a balance of nature in the city if man chooses not to destroy it.

II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the conclusion of a successful encounter, students should be able to:

1. Describe how living things are dependent on a particular environment.
2. Demonstrate that the more plants there are in an area, the more animals will be found.
3. Explain the effect of man's disruption of a habitat on plants and animals.
4. Explain why we must encourage protection of green areas in the cities.

B. Activities:

1. Secure a map of the school grounds.
2. Inventory the "green" areas (areas of abundant plant life), animal homes and unproductive areas (school buildings, parking lot, widewalks, "sand lot," etc.).
3. Select two areas of the same size; one in a woods with undergrowth and one in woods lacking undergrowth (grassy area versus playfield may be used as an alternate).
4. Collect at random insects from both areas for weighing (be sure to keep the collections of both areas separate). You may want to identify the insects as "plant eater" and animal eater".
5. Compare the total weight of the insects in each area. More plant life should support more animal life.
6. Study the data to determine needs, if any, to encourage helpful animals to return.
7. Recommend a plan of action (poster contest, Arbor Day activities, etc.).
8. Implement the plan with individual or class activities.

III. VALUES CLARIFICATION

A. Values Voting:

1. If you had a woods next to a city park, how many would prefer to play in the woods?
2. How many enjoy seeing many birds and other animals in a field or woods?
3. How many have ever planted a tree or shrub?
4. How many have ever placed a feeder, shelter, or bird house near your home?
5. How many have removed the brush from under trees in your backyard or neighborhood?

B. Autobiographical Questionnaire:

Have you ever:

1. Helped to clear shrubs, woods from under trees in a woods? (70% of wildlife live within the first ten feet from the forest floor up).
2. Thrown paper and other trash on the ground or in water? (Litter is ugly and sometimes dangerous to animals).
3. Planted sunflower seeds? (food for birds and other small animals).
4. Looked for insects and other animals under a log and forgot to turn it back over? (Animal homes are destroyed and moisture lost).

IV. RESOURCES

Books:

Concepts in Science, Brandwein, Cooper, Blackwood, Harcourt, Brace & World, 4, 1969.
Basic Concepts of Ecology, Clifford Knight (for teacher).
People and Their Environment, Grades 4-5-6, Matthew J. Brennan, Editor, Ferguson Publishing Company, 1972 (for teacher).
Acclimatization, Steve Van Matre, American Camping Association, 1972 (for teacher).
Ecology: The Forests and Man, George McCue, Benziger, Inc., 1971.
Ecology, George McCue, Benziger, Inc., 1971.

Filmstrips:

"Exploring the World of Nature Series", Society for Visual Education.
"Let's Explore a Field", A423-1.
"Let's Explore a Garden", A423-2.
"Let's Explore a Lawn", A423-3.
"Let's Explore a Pond", A423-4.
"Let's Explore a Stream", A423-5.
"Let's Explore a Woodland", A423-6.

Kits:

Environmental Action: No Time to Waste.
The Creative Teacher, 1971.

Pamphlet:

How to Read the Natural Landscape in Forests and Fields, Millard C. Davis, NSTA publication, 1971.

NATURAL FOODS

Grades 3 and 4

I. INTRODUCTION

"In a world gone mad with pesticides, defoliants, herbicides, growth pills (for both animals and plants) and innumerable other 'aids' to food production..." there are voices expressing concern for our increasingly synthetic world of foods. An English agricultural advisor in India more than 40 years ago, partly out of necessity, but primarily out of a concern for preserving natural cycles of life by returning plant and animal wastes to the soil, proposed growing plants and husbanding animals without using synthetic chemicals.

Natural foods, foods grown "organically," a term coined by J. I. Rodale in the late 1930's to describe the natural method of farming, are more appetizing, more nutritious, and more compatible with a natural way of life.

II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the end of a successful encounter, the child should be able to:

1. Describe the benefits of natural foods.
2. Discuss benefits and limitations of organic farming.
3. Discuss healthful food versus trash food.
4. Explain value of fresh foods and unpeeled foods.
5. Discuss wasted food.
6. Identify edible foods on the school grounds.

B. Activities:

1. Explore the school grounds. Look for natural edible foods. How do these foods differ from foods we eat daily? Why do we grow foods in exposed fields, rather than relying on nature to provide foods? Make a display in the classroom showing the types of edible foods found on the field trip.
2. Contact the N. C. Cooperative Extension Service. Ask for materials on farming, including organic farming. If possible, have an organic farmer explain how food can be grown without using synthetic fertilizers, insecticides, or herbicides.
3. Visit a grocery store. Observe the types of food available. Note types of processing. Read the labels on prepared foods. What ingredients appear to be natural, which seem to be synthetic? Why are the synthetic materials added? Write companies requesting an explanation of specific food additives listed on packages.
4. Write to the U. S. Food and Drug Administration: Public Information Officer. Request information on food additives. Ask specific questions regarding additives you have seen listed on packages of food you eat.
5. Examine different forms of processed foods in the classroom. Discuss how the foods were prepared. Discuss peeling of vegetables. What happens to peelings and other organic wastes? Could they be composted?
6. Bring in a stalk of wheat. Use this to compare white bread and brown bread. Discuss these questions: a) What causes the color in the bread? b) Which part of the grain would have more food value? c) What part of the grain is used? d) Where do we get wheat germ? Display the types of grain available as well as some products from these grains, including wrappers, boxes, etc.
7. Have students draw a picture of the lunch they would select from the Basic Four. Discuss why they think it is a good lunch. Discuss meal planning, nutritional needs, new foods, meat substitutes, etc.
8. Display good and "trash" snacks and compare the items. Examples: coke - juice; cookie - fruits. Plan and actually prepare a good snack at school. Examples: Cookies using special ingredients as peanut butter, wheat germ, coconut, nuts, or dried fruits.
9. Discuss vitamins (minerals) in foods. Discuss vitamin loss by overcooking, using too much water in cooking, etc.
10. Make a collection of nutritional recipes. Prepare some of the recipes in the classroom at school. Examples: Make peanut butter (Good Earth Almanac). Toast pumpkin seeds.
11. Keep a food diary for five days. At the end, check the days you ate food from each of the four basic groups.
12. List 10 snacks. Vote according to best food values. Include milk, coke, green celery, whole wheat crackers, peanut butter, ice cream, cookie, fruit (apple), candy bar, popcorn.

13. Trace the items listed below as to source. Discuss snythetic additions to the food at each step.

grits	cottage cheese
flour	hamburger
milk	

III. VALUES CLARIFICATION

A. Values Decision:

1. I would be able to eat

	All	Some	None
Nuts			
Mushrooms			
Wild berries			
Wild fruits			
Roots			

B. Values Voting:

1. I would eat unpeeled carrots.
   I would always carry peelings to compost pit.

C. Rank Order:

1. Rank 1, 2, or 3 as to vitamins.

Fresh spinach ____	Orange ____
Canned spinach ____	Orange juice ____
Frozen spinach ____	Orange drink ____

IV. RESOURCES

Books:

Algae, Schlichting, H. E. and M. S., Stech-Vaughn, 1970.
Toadstoals and Such, Russel, Solveig P., Steck-Vaughn, 1970.
Science Experiments You Can Eat, Cobb, Vicki, J. P. Lippincott Company, Philadelphia and New York, 1972.
Good Earth Almanac, Universal Press Syndicate, 1973.
The Basic Book of Organic Gardening, Rodale, Robert, Ballantine Books, Inc., 1971.
Edible Wild Plants, Fernald, Merritt Lyndon and Kinsey, Alfred Charles, Harper and Row, 1958.

Filmstrips:

"A Visit to a Garden," Encyclopedia Brittanica.
"The Wonderful World of Plants," Society for Visual Education.
"Food Makes History," Popular Science, black and white.
"Foods for Health", Y. A., color

Films:

"Where Does Our Food Come From?", color, 16 mm, 11 minutes, CORF.
"The Food Store," color, 13 minutes.

Whole Wheat Molasses Cookies

Bake at 350 degrees for 7 minutes. Portable oven works well.
½ c. butter or margarine
¼ c. sugar
¼ c. molasses
½ t. salt
2 t. soda
1 t. each ground ginger, cinnamon
¼ t. ground cloves
1½ c. whole wheat flour
2 T. vinegar
Melt butter with sugar and molasses in small sauce pan. Cool. Add flour and spices, then vinegar. Drop by teaspoonfuls onto greased cookie sheet. Bake.

Zippy Toasted Pumpkin Seeds

2 c. pumpkin seeds
2 T. Worchestershire
2 T. butter, melted
2 T. grated parmesan cheese
Salt
Mix all ingredients; put in jelly roll pan. Toast at 375 degrees about 15 minutes. Stir every five minutes.

Arab Dates

½ c. honey
½ c. chopped toasted almonds
¼ c. chopped candied citron
½ c. chopped walnuts
1 lb. pitted dates
Mix first four ingredients. Stuff dates with mixture; roll in sugar; store air tight.

INTERDEPENDENCE OF LIVING THINGS

Grades 5 and 6

I. INTRODUCTION

Can you imagine what this world would be like if all life was destroyed except for one group of organisms? What group could survive without the support of any other living thing? You may decide upon green plants as your answer, but could green plants survive long without the insects for pollination? What about plants depending upon animals for seed dispersal? What about the need for animals, such as earthworms, moles and ants to keep the soil aerated? When plants such as algae use all the available nitrogen compounds, what would occur? Think about the important role that nitrogen fixing bacteria perform by replacing nitrogen compounds that have been used by plants and animals. When plants mature and eventually die, it is the small microscopic animal life, such as bacteria that help to decompose and break-down various chemicals and return the nutrients back to the soil. It is also important to remember that animals as they feed upon other plants and animals return carbon dioxide and water back to the environment which plants use during the process of photosynthesis. Without this interdependency and recycling of materials, much of the life on earth would cease to exist.

The producers, green plants, cannot live alone. They must depend upon consumers for their survival. Consumers are both animals and saprophytic plants. The decomposers are essential for the return of nutrients back to the soil to be reused again by plants and animals. Therefore it is important to note that all living things, including people, are interdependent and interrelated, and our activities or programs affecting the environment must be responsive to this concept if we are to survive.

II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the conclusion of a successful encounter, the student should be able to:

1. Know the value of all living things in maintaining the balance in nature.
2. Know that living things take matter from the environment and return matter to the environment.
3. Realize how important producers are in relation to the land ethic and providing for animals from the most minute to the largest.
4. Recognize how saprophytes, i.e. molds, yeast, and bacteria, depend upon other organisms for food (energy) because they lack chlorophyll.
5. Realize that predation in nature is an important means for maintaining a balance, and that producers must outnumber consumers.
6. Realize that the environment is in a constant state of change, and that people are now the key contributors to that change, which is not always to the benefit of the environment.

B. Activities:

1. Read your local newspaper and look around your community to locate a healthy ecosystem, a recently destroyed ecosystem, and an ecosystem which can be rescued from destruction. Discuss with students what impact they can have on each.
2. Establish small ecosystems in the classroom for observation. Use aquariums, terrariums, and insectariums. A tiny ecosystem in a test tube can be made by corking an aquatic snail and a green water plant. The ecosystems do not necessarily have to be balanced to be a learning situation.
3. Research the environmental decline of Lake Erie. Is it dying? If so, why?
4. Research why starfish are over-producing and sea snails are declining.
5. Research how insecticides, such as DDT, have upset the web of life in some areas, and contributed to the increase of endangered species.
6. Consider doing some of the following mini-field trips around the school:
   a. Study a tree carefully and list all plants and animals that are on it, beneath it, and around it. After returning to class, discuss the number of interrelationships and make food webs of this small ecosystem.
   b. Examine a hedge or vine growth on a fence to determine the producer, consumer, decomposer relationships.
   c. Examine a tree stump for interrelationships.
   d. Examine a leaf or compost pile. Look for white thread-like fungi (decomposers), green plants (producers), and animals (consumers). What is the soil relationship?
   e. Examine a board or log that is in the process of decay. Take an animal census and determine who is the eaten and who is the eater.

f. Look for examples of mutualism (two organisms have a relationship that is beneficial to each other). For example: alfalfa, clover, vetch, beans, peas, and peanuts have special bacteria that live on their roots in nodules and take nitrogen from the air converting it to nitrogen compounds which plants can use. The bacteria utilize some of the food produced by the plant and in return give the plant the needed nitrogen compounds to make protein.

g. Additional activities may include finding examples of: soil building, man altering the environment, wise cutting of trees, erosion, and natural animal shelters.

7. Observe the interrelationships of insects and flowers. Some insects feed on pollen and some on nectar. Bees are the best pollenators. Digger wasps eat mectar and their larvae eat grasshoppers which are a garden pest. Without bees, butterflies, moths, etc. to pollenate, much of the plant food would be limited to grass or only those plants that can self-pollenate or be pollenated by the wind.

III. VALUES CLARIFICATION

A. Rank Order:

1. Place the following in the order that you would prefer to be:

a.		b.	
_____	grasshopper	_____	honeybee
_____	lady bug	_____	boll weevil
_____	ant	_____	aphid
_____	preying mantis	_____	bag worm
_____	butterfly	_____	clothes moth

2. If you could be a plant, in what order would you choose to be:

a.		b.	
_____	apple tree	_____	honeysuckle
_____	crab grass	_____	pine
_____	poison ivy	_____	rose bush
_____	oak tree	_____	shelf fungi
_____	jonquil	_____	fern

B. Values Rating:

1. Choose an animal from the following and put its name on the chart below: snake, cat, rat, snail, honeybee, people, yourself, blue jay, humming bird, rabbit.
2. Choose a plant from the following and put its name on the chart below: clover, venus fly trap, corn, oak tree, mushroom, algae, pine tree, poison ivy, lichen, tulip.

Good	_____ : _____ : _____ : _____ : _____	Bad
Valuable	_____ : _____ : _____ : _____ : _____	Worthless
Clear	_____ : _____ : _____ : _____ : _____	Dirty
Strong	_____ : _____ : _____ : _____ : _____	Weak
Hard	_____ : _____ : _____ : _____ : _____	Soft
Rugged	_____ : _____ : _____ : _____ : _____	Delicate
Ferocious	_____ : _____ : _____ : _____ : _____	Peaceful
Fast	_____ : _____ : _____ : _____ : _____	Slow
Hot	_____ : _____ : _____ : _____ : _____	Cold

C. Word Association:

1. Show students several pictures of plants and/or animals and have them write down within five seconds three words that come to mind. After listing the words for all pictures, ask for volunteers to give their words and an explanation.

D. Values Wheel:

1. Draw a circle and divide it into three parts. In a small ecosystem on the school grounds determine the percentage of producers, consumers, and decomposers that you can see and place the percentages in the wheel. Discuss the reasons for the variation.

E. Continuum:

1. Where on the continuum would you place yourself as to the importance of producers or consumers.

Producers Consumers

F. Value Survey:

1. Give the students a list of eighteen organisms that include producers, consumers, and decomposers. Make sure that they are arranged in alphabetical order. Tell the students to rearrange them in an order that is important to them as affecting their life. This strategy can be incorporated into a "scavenger hunt" on the school grounds nature trail. Points can be given for those organisms that are found, and subtracted from the total for anything that the students damage.

IV. RESOURCES

Films:

The Ecosystem: Network of Life, BFA, 16mm., color, 11 min.
Life in A Vacant Lot, EBEC, 16mm., color, 10 min.
The Honeybee, EBEC, 16mm., black & white, 11 min.
Social Insects: Honeybee, EBEC, 16mm., color, 24 min.
The Ecology Primer, Amer. Educ. Films, 16mm., color, 18 min.

Filmstrips:

"Dependent Plants", SVE
"Mushrooms", SVE
"Exploring the World of Nature" series of 6, SVE

Kits:

"Our Environment: Problem or Promise?", A.J.Nystrom & Co., 1972.
"First Follow Nature", Scholastic Educ. Services.
"Sharing the Earth", Scholastic Educ. Services.
"Environmental Awareness Kit", Environmental Education Center.

Games:

"Make Your Own World", Coca-Cola Ecology Kit, 1971.

Books and Booklets:

Ecology, George McCue, Benzieger, Inc., 1971.
Ecology: The City, George McCue, Bensieger, Inc., 1971.
Ecology: The Forests and Man, George McCue, Bensieger, Inc., 1971.
Ecology: The Freshwaters and Man, George McCue, Bensieger, Inc., 1971.
Ecology: The Suburbs, George McCue, Bensieger, Inc., 1971.
Ecology, The Study of Environment, H.E.Schlichting and M.S.Schlichting, Steck-Vaughn Co., 1971.
Toadstools and Such, Solveig Paulson Russell, Steck-Vaughn Co., 1970.

Posters:

"Ecology: Ecosystems", Teaching Pictures with guide, David C. Cook Publishing Co., 1973.
"Ecology: The Pollution Problem", Teaching Pictures with guide, David C. Cook Publishing Co., 1972.

MUDDY RAINDROPS

Grades I and 2

I. INTRODUCTION

Erosion is the process where the features of the earth are changed by rainfall, wind, and any other agent that breaks down the soil and rocks. Because of the consistency of the soil in Mecklenburg County (typically red clay), water is not easily absorbed. The heavy runoff results in erosion. The degree of erosion depends on vegetation, the slope of the ground, and the use of the existing terrain; i.e., land under construction.

II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

Following a successful encounter, students should be able to:

1. Recognize when and where erosion has taken place.
2. Understand what happens when erosion takes place.
3. Describe simple methods to control erosion such as planting grass, rocks, terracing, etc.

B. Activities:

1. Field trip to school yard to discover erosion.
2. List and locate eroded areas on map.
3. Plant grass in one area to show control.
4. Build a rock terrace in another area to show control.
5. Leave one area as found to use as comparison.

	Grassed	Rock	Unclaimed
1st Week			
2nd Week			
3rd Week			

6. What conclusion can we reach after our collected information?
7. Evaluation of a solution. Did the grass help? Was the rock terrace sufficient?
8. Follow through with solution. Select the best method and fix the eroded areas.

III. VALUES CLARIFICATION

A. Values Voting:

1. How many of you would like to have a grassed playground?
2. How many of you like to play in the mud?
3. How many of you would drink muddy water?
4. How many of you like to see water running down a dirt hill?

B. Rank Order:

1. Rank in the order that you would prefer to play during your play period.
   a. Hardtop playground
   b. Dirt playground
   c. Grassed playground
2. If you saw rut erosion on a little hill, rank in the order that you would correct the erosion.
   a. Plant grass
   b. Use gravel
   c. Terrace

IV. RESOURCES

Films:

"Your Friend the Soil: Keep It or Lose It", color, 6 minutes, Ency. Brit.
"Water, Water Everywhere", 11 minutes, Ency. Brit.
"The Soil and Life", color, 14 minutes, UW:F.

Filmstrips:

"Soil and Water Conservation", Heath.
"The Muddy Raindrops, Society for Visual Education.
"The Lamb and the Bluebells, Society for Visual Education.

"The Meaning of Conservation", MEHT.

Pamphlets:

The Soil That Went to Town, (free from local Soil Conservation Office).

WASTEWATER TREATMENT

Grades 5 and 6

I. INTRODUCTION

Millions of gallons, 35 to 40 million gallons, of water enter and leave Mecklenburg County daily. It adds up to more than 100 gallons per person per day. Most is treated before it is used and again after it is used.

As in any urban setting, the cleansing and disposing of wastewater is no small problem. Septic tanks for isolated home owners and sewage treatment plants which serve clusters of country residents and urbanites are in many cases ineffective or overloaded.

Septic tanks are simple but they have many disadvantages. Underground septic tanks generally hold up to 11,000 gallons of water. They contain bacteria which biologically break down the organic wastes into dissolved nutrients--a very natural process which occurs everywhere in nature--biodegradation. Liquid containing the decomposed materials overflows into a drain field which has small openings which allow the water to be absorbed into the soil. The dissolved materials are rich nutrient additions to the soil.

The disadvantages of septic tanks are obvious. During periods of heavy rain, the soil cannot absorb the tank overflow. Undecomposed wastes may be flushed into nearby waterways or pools above the ground. There is a danger of disease. Some areas are not suitable for septic tanks. When the lake is high, septic tanks can flood and untreated wastes and excessive nutrients may enter the lake.

Charlotte operates three sewage treatment plants, the county operates four others and county towns operate their own. Primary and secondary treatment of wastewater is employed.

Primary treatment is a sedimentation process. When wastewater arrives at the sewage treatment plant, it is screened and large solids such as sticks, rags, etc., are shredded and removed. Next it enters large settling or clarification tanks where the rate of flow is greatly reduced. Suspended solids settle where they are collected and oil, grease and floating materials are skimmed from the surface. This, the sedimentation and skimmings, is called sludge. This rich organic sludge is sent to the digestor where anerobic bacteria (bacteria which do not require free oxygen to decompose wastes) further decompose it for several days. Primary sewage treatment, then, is primarily a mechanical process where secondary sewage treatment is essential biological.

In many areas wastewater treatment ends with primary treatment and only about 50 per cent of the pollutants are removed from the water before it is returned to a stream or lake. Secondary treatment will remove up to 90 per cent of the organic materials and the suspended solids.

The trickling filter process is one method of secondary treatment of wastewater. The effluent from primary treatment is allowed to trickle through a deep bed of stones which are covered with a biologically active which is rich in decomposing bacteria. As in nature, bacteria will decompose organic wastes. As the floc builds up it sloughs off and moves from the bottom of the tank with the water to a settling basin. The sludge which settles is sent to the digester for further decomposition.

Another way to take advantage of biological decomposition is to add bacteria and oxygen to wastewater for several hours. This is called the activated sludge process because active bacteria in the sludge are added to the aeration tanks where air is bubbled through to aid the decomposing bacteria. Chlorine is added to the final effluent to kill bacteria.

Both processes are subject to biological dieoff when excessive amounts of toxic materials enter the system. This renders the treatment ineffective for seven to ten days until the bacteria re-establish themselves.

After treatment the quality of wastewater can be measured in several ways. BOD, Biochemical Oxygen Demand, is one way. It is the rate at which organic wastes need dissolved oxygen in the water for decomposition. As the chart shows, further treatment or tertiary treatment must be added if water which Charlotte dumps into Sugar Creek and McAlpine Creek are going to be as clean as the water which Charlotte takes from Lake Norman.

	BOD Reduction	Suspended Solids Reduction	Phosphate Removal	Cost/1000 Gallons
Primary Treatment	35%	45%	20%	$0.10
Secondary Treatment	90%	90%	30%	0.20
Tertiary Treatment	99%	99%	99%	0.40

If our country's goals for clean water everywhere are to be met cities like Charlotte will

have to do a better job of treating wastewater. The Federal Water Pollution Control Act Amendment, passed on October 18, 1972, states that by July 1, 1983, all U. S. waters will be clean enough for recreational use and that by 1985, there will be no discharge of pollutants into our waters.

II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the conclusion of a successful encounter, the student should be able to:

1. Explain, using a map, where Charlotte gets its water and where treated wastewater leaves the city.
2. Explain how a septic tank removes wastes from water, including disadvantages associated with the use of septic tanks.
3. Discuss how wastewater is treated at a sewage treatment plant.
4. Discuss disadvantages of present wastewater treatment.

B. Activities:

1. Contact the Department of Public Works for the City of Charlotte or Mecklenburg County. Request information on water use in the area. Where does the city get its water? How and where is it treated before it enters our homes? Where does wastewater go after it leaves our homes? Where is it treated? How much is treated daily? On a map of the area trace the path of water in and out of Charlotte.
2. Visit a sewage treatment plant. How much water is treated daily? What is the cost? Follow the water through the plant noting what is done at each step. How long does the whole process take? Where is the natural process of biological decomposition taking place? Where does the treated water go? What is the condition of that stream? How often is this effluent tested? What is the quality of the effluent? What percentage of the organic wastes are removed? Suspended solids? What is the BOD count before and after treatment? Are there problems following heavy rains? Are there restrictions on what industries can send to the plant? How are new sewage treatment plants financed?
3. Contact the County Health Department. Ask the following questions. What additional treatment will be neccessary to meet the 1983 and 1985 water quality standards? What problems are caused by pollutants which are not now removed by sewage treatment plants? Which industries have their own sewage treatment plants?
4. In the classroom list ways individuals can cut down on wastes added to water. Don't use garbage disposals, use low phosphate detergents, etc. Publicize facts about wastewater to others in the school and parents. Write to the Regional Office of the Air and Water Quality Control Commission in Concord regarding your concern with wastewater disposal in Charlotte-Mecklenburg.

III. VALUES CLARIFICATION

A. Values Voting:

1. How many of you use a septic tank, municipal sewage, wastewater treatment facilities?
2. Would you eat a tomato that was grown with sludge as a fertilizer?
3. How many would be willing to drink treated sewage water?
4. How many would be willing to drink water in space ships after they had been out for several weeks?

B. Rank Order:

1. Which do you consider most effective: septic tank, municipal sewage or wastewater treatment?

C. Continuum:

1. If you could use sludge where would you place yourself?

IV. RESOURCES

Books and Pamphlets:

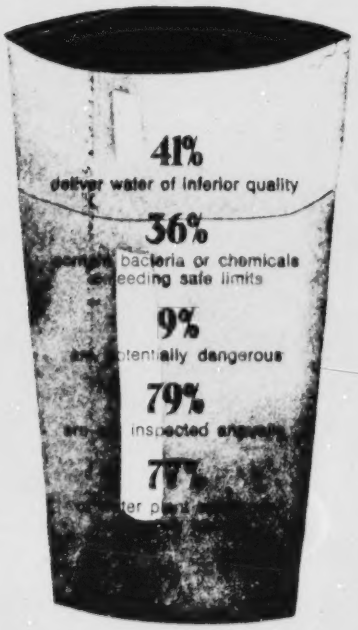
Mecklenburg Metropolitan Sewage Facilities, Hennigson, Durham and Richardson, 1969
A Primer on Wastewater Treatment, Ruckelshaus, William D., 1971.
Field Guide to Environmental Education, Charlotte-MEcklenburg Schools, 1972.
Environmental Education Program, Stapp, William B., 1971. (unpublished, K - 12)

Films:

"Public Health Program in Mass Evacuation", NMA, 16 mm, 13 minutes, Black and White.
"The Pursuit of Cleanliness", AFI, 16 mm, 14 minutes, Color.
"The Treatment was Successful, but the Patient Died", NAC, 16 mm, 30 minutes, Color.
"Activated Sludge Plant with Vacuum Filtration and Incineration", PHS, 35 mm, 8 minutes, Black and White.
"Bio Pac", LBC, 16 mm, 13 minutes, Color.
"Clean Waters", CIL, 16 mm, 24 minutes, Color.
"Constructing a Typical Household System", PHS, 16 mm, 14 minutes, Black and White.
"Municipal Sewage Treatment Process", PHS, 16 mm, 13 minutes, Black and White.
"Sewers: A Hidden Community Benefit", PAC, 16 mm, 30 minutes, Color.
"Tale of the Twin Cities", MSP, Loan, 16 mm, 30 minutes, Color.
"Living with Today's Waters", Mod, 16 mm, 26 minutes, Color.

Is your drinking water safe?

A survey of 969 public water systems shows:



$$$$$$$

Poorly treated water spreads disease and runs up an incalculable health bill

Price tag on clean water

It will take a 5-year investment of $42 billion to clean up water. Over half is industry's responsibility.

	In billions
1. Municipal waste treatment plant construction costs:	
a. Primary and secondary treatment	$8.7
b. Tertiary treatment	$3.9
c. Operation and maintenance	$4.5
2. Industrial abatement costs:	
a. Nonthermal	$3.2
b. Reduce thermal pollution	$2.0
c. Operation and maintenance	$4.0
3. Interceptor and storm sewer improvement costs	$ 7.4
4. Sediment control and acid mine drainage reduction costs	$6.6
5. Reduction costs for oil spills, water craft discharge and miscellaneous	$ 1.0
6. Added reservoir storage for low flow augmentation	$ 1.0
Grand total	$42.3 Billion

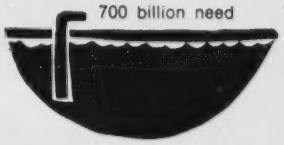
What's being done about it?

Only 32 states have fully approved water quality standards. More than 1,000 communities dump raw sewage into water.

Scoreboard as of July 15, 1971
32 states have approved water quality standards, including antidegradation. Gain over 1970 EQ Index of six.
3 states have approved water quality standards but without antidegradation.
15 states have partially approved water quality standards, only 7 including antidegradation.
Gain of 16 states with antidegradation clauses over last year.

Will water be rationed?

North Americans are removing fresh water from underground sources twice as fast as the hydrological cycle can replace it. Europeans three times as fast. At present rate, Americans will need 700 billion gallons of underground water per year in 1980; only 650 billion will be available.



DIRTY WATER

Grades 5 and 6

I. INTRODUCTION

Water--the universal solvent, the most abundand substance on the surface of the earth covering three-fourths of that surface, giver of life and cleanser of the biosphere--is in trouble. The trouble-maker is man.

Human uses of water are endless. In addition to supporting life, water cleans, cools, produces power, supports transportation and can be the site for recreational activity. On the average, each urbanite, including Charlotteans, uses about 155 gallons of water per person per day. If total use, including production of food, clothing, paper, steel, etc., is calculated, the average is in the neighborhood of 1500 gallons per person per day.

For millions of years waters have been receiving the wastes of natural systems--animal wastes and plant wastes. And for millions of years natural processes have been decomposing and recycling the wastes. How?

When organic waste material is added to streams and lakes decomposing bacteria begin to break it down. These bacteria require oxygen--oxygen dissolved in the water. Eventually, the decomposed wastes are little more than reusable elements and compounds--carbon, hydrogen, phosphorus, and nitrogen.

If waters are self-cleansing, why then is modern man faced with polluted creeks, rivers, and lakes? The answer is clear. Too many people living too close together dumping too many wastes into limited supplies of water. The natural decomposition system becomes overloaded. Tireless decomposing bacteria run out of oxygen before the excessive amounts of wastes have been broken down. Occasionally, decomposing bacteria are killed outright by toxic industrial wastes. When decomposing bacteria run short of dissolved oxygen or are killed, natural decomposition stops. Anerobic bacteria, which do not require free oxygen, begin to work on undecomposed wastes. Foul odors result. Undecomposed wastes collect. Other plants and animals leave or die from a lack of oxygen. The bodies of these dead organisms must also be decomposed. The water becomes polluted.

Pollution can be classified according to its cause. Organic pollution was described above. Human wastes and farm wastes are not the sole sources. Food processing industries, pulp and paper mills and oil industries, to mention a few, generate huge amounts of organic wastes. Nutrients; i.e., phosphorus and nitrogen, which are among the end products of organic decomposition are also plant fertilizers. Streams and rivers which are recipients of excessive amounts of these nutrients often produce excessive amounts of algae. Blue-green "algae blooms" float reducing the penetration of sunlight. Other plants and animals are affected by the decreasing amounts of dissolved oxygen and sunlight. Dieoffs and more pollution can result.

Thermal pollution is caused by increasing the temperature of natural water. When power plants and other industries use water for cooling, the water is returned to the river or lake warmed. This process can raise the termperature of the water by ten to twenty degrees in the immediate vicinity of the plant. Warmer water absorbs less oxygen so the decomposition of organic wastes mentioned above is slowed. Also, the increased termperatures increase the metabolic rate of many aquatic organisms, thereby increasing their demand for oxygen.

II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the conclusion of a successful encounter, the student should be able to:

1. Describe the causes and effects of organic, industrial, sewage, and thermal pollution.
2. Describe the natural self-cleansing process of water (biological decomposition or biodegradation in water).
3. Describe how waste overload disrupts this natural self-cleansing process including causes and effect of low dissolved oxygen.
4. Explain causes and effects of nutrients which overfertilize natural waters.
5. Develop and carry out a plan to improve water quality in the area.

B. Activities:

1. Secure a map of the area including creeks, ponds, rivers and lakes. Indicate (1) sources of area water. Where does tap water come from? (2) Where does waste water go? Drain water? Storm sewer water? List (3) uses of water while it is in the area (drinking, industry, agriculture, recreational, cleaning, cooling, waste disposal, etc.). (4) How does area water become polluted? Discuss (5) the purpose of

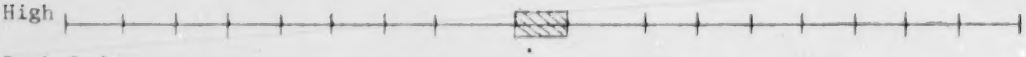
sanitary sewers. Storm sewers. Locate sewer lines near the school.

2. Visit, individually or as a class, nearby bodies of water. Note water quality (turbidity or mudiness, healthy vegetation, trash, level of flow, etc.). Test for dissolved oxygen. Record temperatures. Is there evidence of nonbiodegradable substances in the water? Chart results. (6) Speculate on what waste water is dumped into the water. Pinpoint sources of pollution--large storm drains, industrial sources, agricultural runoff, sewage treatment effluent, etc. Collect samples from several bodies of water for classroom study.
3. (7) Contact the County Board of Health or the Regional Office of the Air and Water Quality Control Commission. How are area bodies of water classified? (drinking, swimming, industrial dumping, etc.). What are the water quality standards for the various types of use? How are water quality standards enforced? Who is in charge of enforcement?
4. In the classroom study how water naturally cleanses itself. Study collected samples. Allow small amounts of each sample to evaporate. What is left? Compare plant and animal life. Filter samples. Study the effects of nutrients; i.e., phosphorus on water quality (eutrophication). Study the effects of dissolved oxygen on aquatic life. Study the effects of thermal pollution. Gradually warm natural waters which contain plant and animal life. Fill three jars with distilled water. Put a tablespoon of detergent in jar A, a tablespoon of fertilizer in jar B and leave jar C as it is. In all three jars, pour 1 ounce of pond water. Let stand for two weeks. Compare jars. This experiment could be done again and again with different detergents and fertilizers. One way of removing phosphates from water is by adding calcium. Use the example above and add crushed chalk to jar B and leave the others as they are. What happens? Use two glasses and two pieces of celery. Put distilled water into one and salt water into the other. Let stand a day. Apply silver nitrate test. Does salt change into new substance? Salt, like DDT, is not biodegradable. Check the pH of the different waters with pH paper and a color matching pH chart. Take temperature of water in different ponds, streams, etc. Make a chart. Consider depth, flow rate, waste and organic matter present as well as shading.
5. (8) Study methods of reducing water pollution. Publicize our right to have clean water. Suggest how individuals can help.

III. VALUES CLARIFICATION

A. Strategies:
List ten uses of water. Circle the ones most important to you. Cross out the ones you could do without. What did you find out?

B. Continuum:
Where would you rate yourself as a polluter of our streams?

High  Low

C. Rank Order:
1. Which would you rather do on a beautiful Saturday afternoon?
   a. Go fishing
   b. Go swimming
   c. Play with water sprinkler
2. I am proud that: _____

_____

3. Choose your own way to show how you know that water pollution affects the lives of the people of Charlotte and their life habits.

IV. RESOURCES

Films:
"Clean Water is Everybody's Business", NMA, 35 mm, color

"Clean Water:, NMA, 16 mm, 20 minutes, color
"Crisis on our River", HES, 16 mm, 14 minutes, color
"The Gifts:, MOD Loan, no charge, 16 mm, 28 minutes, color
"Potomac Concept", NPS, 16 mm, 29 minutes, color
"Problem With Water is People:, MHT, 16 mm, 30 minutes, color
"Pure Water and Public Health", MOD, 16 mm, 28 minutes, color
"Water:, NFB, 16 mm, 15 minutes, color
"Your Friend the Water (Clean or Dirty)", ERB, 16 mm, 6 minutes, color
"The New River", API, 16 mm, 23 minutes, color
"How Water Helps Us", CFC, 16 mm, color
"It's Your Decision - Clean Water", AFI, 16 mm, 14 minutes, color
"We Explore the Stream", CFC, 16 mm, color
"The Year of Disaster", MOD, 16 mm, 25 minutes, color

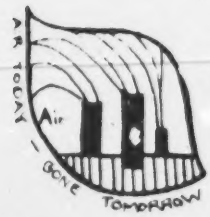
Filmstrips and Records:

"Waste - A New Pollutant", Society for Visual Education.
"Water Pollution - A Complex Problem", Society for Visual Education.

Books and Pamphlets:

Water Pollution, Charles W. Lavaroni, Patrick A. O'Donnell, Lawrence A. Lindberg, Addison-Wesley Publishing Company, 1971.
People and Their Environment: Teacher's Curriculum Guide to Conservation Education, Editor Matthew J. Brennan, J. G. Ferguson Publishing Company, 1972.
A Primer on Waste Water Treatment, Environmental Protection Agency, Water Quality Office, U. S. Government Printing Office, 1971.

SOMETHING'S IN THE AIR



Grades 3 and 4

I. INTRODUCTION

From the time that man first controlled fire, air pollution has been a problem. Caves of early man were blackened by smoke. Roman togas were blackened by soot and in 1273, King Edward I of England banned the burning of fuel which produced excessive smoke. The industrial revolution produced new sources of air pollution. Air became a free garbage dump for airborne industrial wastes. Increasing populations and increasing urbanization (more and more people living closer and closer together) aggravated the problem because air pollution is a man-made problem.

The biggest contributor to air pollution is the automobile. Approximately half of the air pollution in the United States, by weight, is produced by the automobile. The burning of other fuels also contributes to the problem.

What is air pollution? It is lots of things; a complicated collection of gases and particles. Some air pollution you can see, some you can't. Often the latter is the most dangerous.

The most noticeable air pollution is the graying of the skies. It's caused by particles, primarily smoke, soot and fly ash. Such wastes are produced by the burning of a fuel in factories, power plants, and homes.

Of the 140,000,000 tons of pollutants which Americans dump into the air each year, over one-half is an invisible poisonous gas, carbon monoxide. Dangerous concentrations of carbon monoxide can occur in areas of heavy truck and automobile traffic. Long exposure to carbon monoxide can slow reaction time and affect mental functioning. Carbon monoxide cannot be seen and has no odor.

Automobiles also release unburned hydrocarbons and nitric oxides into the air. In the presence of sunlight, these substances become the smog makers. Sunlight changes these pollutants photochemically. Brownish, irritating smog results.

Sulfur dioxide is a dangerous pollutant and is produced when fuels containing sulfur (coal and oil) are burned. Under certain conditions, sulfur dioxide combines with water vapor in the air and it becomes an acid, sulfuric acid, which eats away at statues, buildings, and clothing. It also damages living plants. Often farming is not possible in areas near refineries and smelters which are sources of sulfur dioxide.

The dangers of air pollution are not fully understood, but there have been great air pollution disasters in London and the United States. As air pollutants build up over cities, deaths from respiratory ailments soar. The very young and the very old and those already suffering from respiratory diseases are the most susceptible.

States have established levels for the amount of pollutants that can be released from exhaust pipes of vehicles. The 1971 session of the North Carolina General Assembly did this. It is hoped that by 1975 levels of pollutants in all areas of North Carolina can be within the standards.

II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the end of a successful encounter, the student should be able to:

1. List several components of air pollution.
2. Discuss the sources of air pollution.
3. Explain some of the effects of air pollution.
4. Suggest ways to eliminate air pollution.

B. Activities

1. Contact the Mecklenburg County Health Department. Request information on air pollution. What causes most of the air pollution in the United States? What causes air pollution which can be seen? What air pollutants are invisible? What are the effects of air pollution on humans? Plants? Buildings made of marble or limestone? Paint? Clothing? What do you suppose causes the most air pollution in Charlotte? (Automobiles. Charlotte is the most automobile-oriented city east of the Mississippi.) Is smog merely smoke and fog? (no)
2. Take a walk in the area near the school. Note the sources of air pollution. Test automobile exhaust by using waxed paper vaseline smeared collector paper. Place collector paper on various playground posts. Note areas of highest visible air pollution. On a map of the area near the school, list things which can produce air pollution.
3. Survey a busy street. How many people are there in each automobile? How does this

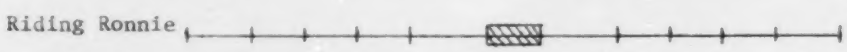
riders in each. Record problems related to urban traffic. Record number of buses or other alternative methods of transportation.

3. Using a map of the area, indicate land used by automobiles. What is the impact of the automobile on the land in the area? How could this amount of land be reduced?
4. Study automobile design, describing the function of design. Investigate installing emission control systems in all cars by writing letters to the three major car manufacturers in Detriot.
5. Collect automobile advertisements from magazines. Discuss selling strategies. Are there important points; e.g., air pollution or gasoline mileage.
6. Visit or contact in writing the Charlotte Traffic Department and/or the Charlotte Mecklenburg Planning Commission. Collect information on mass transit. Collect information on bicycle paths.
7. Draw up a plan for controlling air pollution produced by automobiles. Suggest ways to limit the use of the automobile (car pools, keeping engines tuned, etc.). Discuss plan with parents and other students. Write letters to people who might be interested in the plan. Make charts and posters explaining the plan.

III. VALUES CLARIFICATION

A. Values Voting:
1. How many would rather live in the city?
2. How many think the car is the major source of air pollution in Charlotte?
3. How many feel that the city of Charlotte should maintain a mass transit system?
4. How many will buy a car when you are 18?
5. How many think there are too many cars on the road?
6. How many would rather ride a horse than in a car?
7. How many like automobile exhaust?
8. How many think you will ride a bicycle as an adult?

B. Continuum:
1. Where would you place yourself on the line?



Riding Ronnie always rides his minibike to school even though it has a faulty exhaust. Walking Willie walks to school and every place that he goes.

C. Rank Order:
1. In what order would you place the following if you had to go to the shopping center?
   a. Walk
   b. Ride a bus
   c. Ride a minibike
2. If you were going to the other side of the city, which would you use?
   a. Ride a bicycle
   b. Ride in a car
   c. Ride a bus
3. If you had adequate transportation, in what area of Mecklenburg County would you prefer to live?
   a. Rural community
   b. City
   c. Suburb

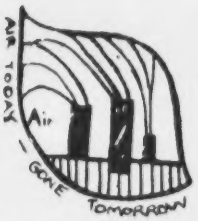
D. Role Playing:
1. Mr Smog drives to work alone every day and refuses to catch the bus that comes by his house. He has a faulty exhaust pipe on his car and his carburetor needs blown out. Mr. Clean tries to persuade Mr. Smog about the dangers of his car and how he is affecting his environment.

IV. RESOURCES

Books:

Environment and Man, Richard Wagner, W. W. Norton & Company, 1971.

AIR TODAY - GONE TOMORROW



Grades 5 and 6

I. INTRODUCTION

It is difficult to view the modern American scene without an automobile in it. In this country there is one automobile for every two and one-half people for a total of 85 million automobiles. If trucks are included, there are as many vehicles in this country as there are automobiles in the rest of the world combined (100 million).

Automobiles are far and away the most serious abusers of the air and most inefficient users of the land. In addition, they are the number one cause of air pollution in the United States (40 to 50 per cent). In some cities, they are responsible for as much as 85 per cent of the air pollution.

It is carbon monoxide, hydrocarbons and nitrogen oxide spewing from automobiles which cause human discomfort and intensify respiratory disorders. Carbon monoxide reacts with the hemoglobin of the blood and robs the body of oxygen. Exposure to low levels over long periods of time slows reaction time and can affect judgment.

Hydrocarbons and nitrogen oxides are the "smog causers." In the presence of sunlight, they react chemically producing new more irritating and more damaging air pollutants. Residents of Los Angeles know this "photochemical smog" well and Charlotte is not without "photochemical smog."

The threat the automobile poses to urban America is not a threat to the air alone. Automobiles are urban land grabbers, contributing to urban sprawl. Doxiadis, the Greek urban planner, suggests that the radius of cities is generally not longer than a 15 minute trip from the city center.

Modern transportation systems have made it possible for cities to expand far beyone earlier limits. In the process, increasing amounts of land are consumed by the transportation system.

In Minneapolis, 50 per cent of the land is devoted to the automobile. In downtown Los Angeles, it's 66 per cent. Charlotte is the most automobile-oriented city east of the Mississippi and ranks sixth in cars per capita in the United States.

The American love affair with the automobile must be curtailed to some extent. Automobiles consume about 50 per cent of the petroleum products refined in the United States. Comparing gasoline consumed per passenger mile, cars are less than one-half as efficient as buses and airplanes are only one-fifth as efficient as buses.

Automobiles certainly won't pass from the scene, but it's time to reconsider alternative modes of transportation. The massive highway building program which successfully tied the nation together with ribbons of interstates, now threatens to strangle urban areas with asphalt freeways and concrete parking lots.

There are alternatives to the automobile. Answers include the building of clean, convenient urban mass transit systems. Gasoline tax monies build interstates and urban freeways. Many insist that gasoline taxes should be used for rebuilding mass transit systems rather than allowing the construction of more and more freeways in urban centers.

Individuals must begin to make commitments to change--to push for and use mass transit systems, to promote bicycle paths, to use automobiles with discretion, and to consider gasoline consumption when buying new automobiles.

At present, the love affair is not over. There are two cars produced for every baby born.

II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the completion of a successful encounter, the student should be able to:

1. Identify problems associated with the use of automobiles in the city.
2. Identify the automobile as a source of air pollution.
3. Explain how the automobile affects land use in cities.
4. Describe ways air pollution can be prevented.
5. Discuss the advantages and disadvantages of alternative methods of transportation.
6. Be able to name some chronic diseases caused by air pollutants.

B. Activities:

1. Take a walk in the neighborhood surrounding the school. What land is used by the automobile? (streets, service stations, driveways, garages, parking lots, etc.) Do residents usually use an automobile, bus, bicycle or walk? What problems does the automobile present? Do neighborhood residents walk or bicycle? Why or why not?
2. Survey a busy street or intersection. Record size of automobiles and number of

affect air pollution? How could automobile traffic be reduced? Are there places to safely ride bicycles? What is the bus schedule? How many people ride buses in Charlotte? Why or why not? Visit a service station. Discuss how automobile emissions can be reduced.

4. Report your findings regarding air pollution in Charlotte to others in the school and community. On a map of Charlotte, locate each parent's place of work. Suggest how they could form car pools. Map the homes of teachers. Could teachers find other ways to get to work? Write a letter to the Charlotte City Coach Lines, Inc., suggesting how they might attract more customers. Write a letter to the editor of a Charlotte newspaper telling why more people should be encouraged to ride buses.

III. VALUES CLARIFICATION

A. Values Voting:
   1. How many of you like to watch logs burn in a fireplace?
   2. How many of you like to smell rubber burning?
   3. How many of you prefer outdoor barbecuing on hot summer days to eating in an air-conditioned restaurant?

B. Continuum:

Harry feels so strongly against air pollution that he wants to live in an air tight balloon.

Polly would be content to live in a tent beside a smoke stack.

C. Rank Order:
   1. If you could choose where you could sit one night to watch stars, how would you rank the following?
      a. Near an airport.
      b. Near a busy highway
      c. On the beach
      d. In a pasture
   2. Rank the following as to which would make you feel best.
      a. Bus fumes
      b. Fresh air
      c. Smell of rain
      d. Smell of charcoal burning.

D. Composition:
   1. Pretend you are an author. Write a composition about air pollution in ten years.

IV. RESOURCES

Books:

Air Pollution, Addison-Wesley Publishing Company, 1971.
Our Dirty Air, Sarah M. Elliott, Messner, 1971.
Pollution, Wentworth, Couchmen, McBean, Stechner, Mine Publications, Inc., 1971.
Pollution, Examining Your Environment, Mine Publications, Inc., 1971.

Filmstrips:

Pollution - America's Urban Crisis. Society for Visual Education.
The Air Pollution Menace. Society for Visual Education.

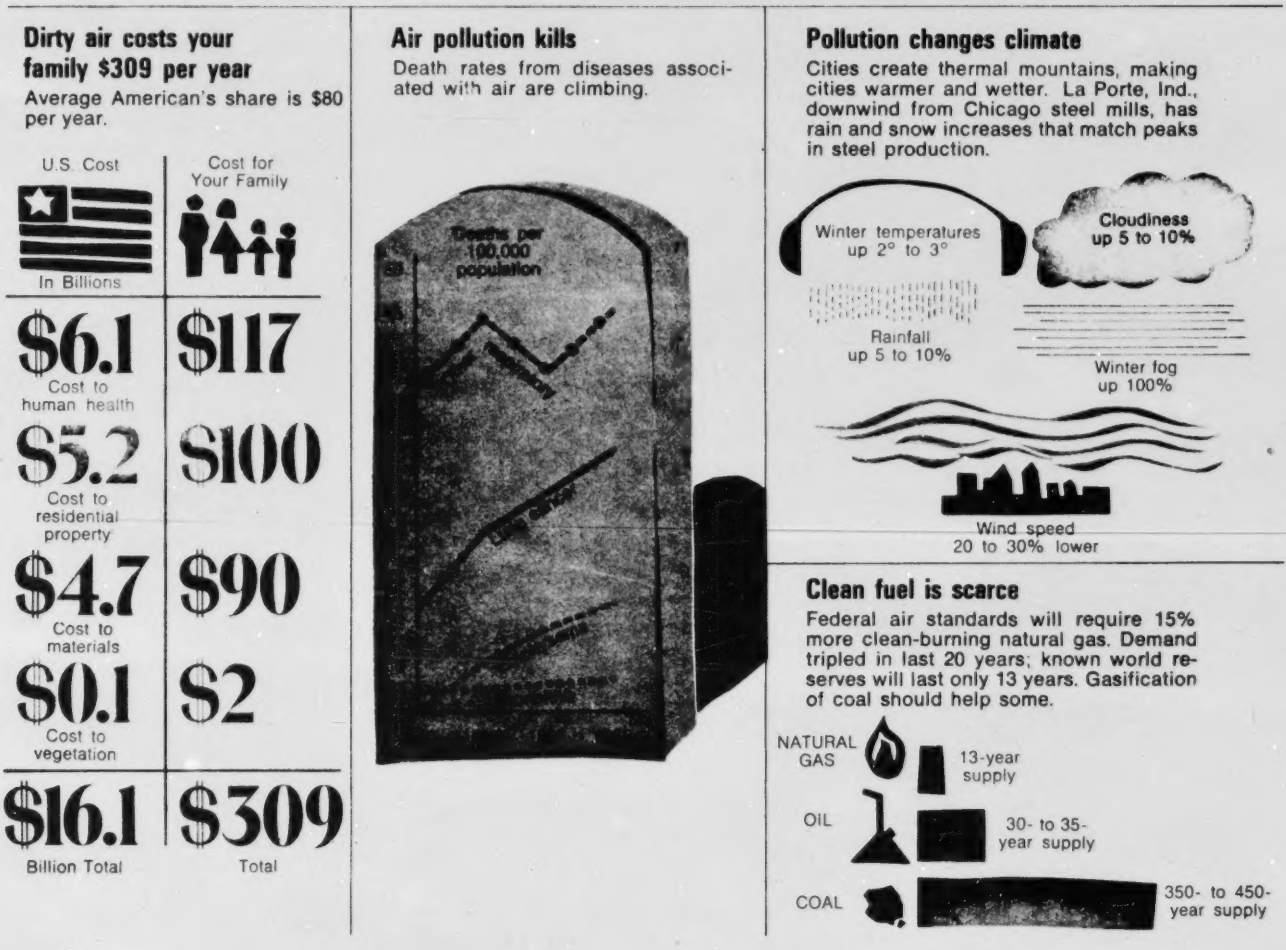
Road to Run, A. O. Mowbray, J. B. Lippincott Company, 1969.
Man and the Environment, Arthur S. Boughey, Macmillan Company, 1971.
Air Pollution, World Health Organization, 1961.
Air Pollution Aspects of Emission Sources: Electric Power Production, Office of Air Programs, Environmental Protection Agency, GPO, 1971.
Community Action Program for Air Pollution, National Association of Countries, NAC, 1966.
Guide for Control of Air Pollution Episodes in Medium Sized Urban Areas, Office of Air Programs, GPO.
Long Term Effects of Air Pollution, A Survey Center for the Environment and Man, Order No. PO-193-001, N.T.I.S.
The Source of Air Pollution, Department of Health, Education and Welfare, 1966.

Filmstrips:

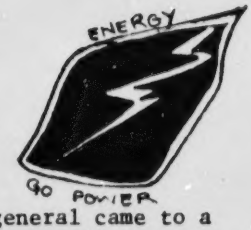
"America's Urban Crisis,"Society for Visual Education, color.
"The Air Pollution Menace", Society for Visual Education, color.
"The Transportation Crisis:, Popular Science, 1955, color (Charlotte-Mecklenburg Schools).
"The Ecological Crisis, Scoeity for Visual Education.

Kit:

Environmental Kit (available from Environmental Education Center).


Dirty air costs your family $309 per year
Average American's share is $80 per year.
U.S. Cost
In Billions
Cost for Your Family
$6.1
Cost to human health
$117
$5.2
Cost to residential property
$100
$4.7
Cost to materials
$90
$0.1
Cost to vegetation
$2
$16.1
Billion Total
$309
Total
Air pollution kills
Death rates from diseases associated with air are climbing.
Deaths per 100,000 population
Pollution changes climate
Cities create thermal mountains, making cities warmer and wetter. La Porte, Ind., downwind from Chicago steel mills, has rain and snow increases that match peaks in steel production.
Winter temperatures up 2° to 3°
Cloudiness up 5 to 10%
Rainfall up 5 to 10%
Winter fog up 100%
Wind speed 20 to 30% lower
Clean fuel is scarce
Federal air standards will require 15% more clean-burning natural gas. Demand tripled in last 20 years; known world reserves will last only 13 years. Gasification of coal should help some.
NATURAL GAS
13-year supply
OIL
30- to 35-year supply
COAL
350- to 450-year supply

POWER TO SPARE



Grades I and 2

I. INTRODUCTION

The year, 1973, was one in which our elected officials and mankind in general came to a realization of the need for energy conservation. Fuel supplies began being controlled and rationed in many aspects of life. Controls were requested among individuals in homes, schools, recreation, and industry. Such controls were so necessary because of the increasing consumption of energy resources in the U. S. Between 1950 and 1970, U. S. consumption of energy resources doubled, growing twice as fast as the population growth rate. Even though our President declared there were adequate fuel resources, they were being produced at a slower rate than necessary to meet consumption demands. These energy producing resources, except for atomic energy, will likely continue to be produced at a declining rate than necessary to meet future demands. Therefore, individuals must be aware of energy consumption. Hopefully such an awareness will bring about greater effort and concern for ways to reduce consumption.

II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the conclusion of a successful encounter, the student should be able to:

1. Understand that energy is produced by fossil fuels.
2. List ways in which people use energy daily; i.e., appliances, transportation.
3. Name some of the fossil fuels which man uses for energy.
4. Discuss ways energy is wasted.
5. Discuss methods of conserving energy.

B. Activities:

1. Survey the classroom. How many things in the room need electricity? Map electrical appliances in the room. Discuss where electricity comes from. Name things in the room which required electricity of fossil fuel to be manufactured. Name things which did not require electricity of fossil fuels to be manufactured. Discuss how electricity could be conserved in the classroom.
2. Survey otherparts of the school. Ask the custodian how the school is heated. Where does electricity enter the school? Where else in the school is fuel or electricity used? Discuss how fuel energy could be saved.
3. Investigate how students use fuel to get to school, in their recreational activities, at home. Photograph, draw or collect pictures of items and activities which require fuel or electricity.
4. Make a bulletin board using pictures to classify different uses of energy. Make a chart showing the types of ways we use energy. Example:

Appliances	Transportation	Recreation

5. Use an experience technique to stress the act of depleting the source. (Example: Let the student drink up a limited supply of Coke.) Help students see from the experience how we use up our natural resources. Discuss that we are depleting fossil fuel when we waste energy.
6. Make a station using a dry cell, wire, light bulb, and a door bell. Let the children experiment with these items to discover various facts.
7. List possible methods of conserving energy at school, at home. Exaluate methods of conserving energy and rank from most efficient to least efficient. Make school aware of energy conservation. Practice energy conservation.

III. VALUES CLARIFICATION

A. Continuum:

1. Construct a continuum large enough to put on the floor. Have the children decide which they would be most like. Careless Carl who never bothers to turn the stereo, TV, radio, lights, etc. off when he is through using them or Careful Clara who always takes time to cut off appliances when she has finished using them even if the house is on fire.

Careless Carl Careful Clara

B. Rank Order:

1. Have the children look at a group of three pictures of things that use energy. Give the following instructions. Color the picture of the thing you like to use best red. Color the picture of the thing you like to use next best blue. Color the thing you like to use least green.

IV. RESOURCES

Books:

Clarifying Values Through Subject Matter, Merrill Harmes, Howard Kirshen baum, Sidney Simon. Winston Press, 1973.
Energy and Power, Robert Irving, Alfred A. Knopf, N. Y., 1959.
Teaching for Survival, Mark Terry, Ballantine Books, INc., 1971.

ENERGY CONSERVATION

Grades 3 and 4

I. INTRODUCTION

Fuel resources on this "Spaceship Earth" are limited or finite. It is true that new coal and oil deposits are being discovered, but the rate is so slow that these resources must be considered non-renewable resources--resources which will not replenish themselves as plants and animals do, and as water through the water cycle does. The per capita demand for energy in the United States is skyrocketing. Between 1950 and 1970, U.S. consumption of energy resources doubled, growing twice as fast as the population was growing. An alarming fact: Americans consume for air conditioning the same amount of power that all 800 million Chinese need for everything.

Fuel Consumption in the U.S.	
Year	1970
Household	19%
Industrial	41%
Transportation	25%
Commercial	14%
Other	1%

We have large supplies of coal in this country, but our supplies of oil and gas are not abundant. To protect ourselves from shortages we must control use of energy resources and individuals must learn to conserve energy.

The automobile is a big consumer of fuel. Twenty-five per cent of the fuel used in the U.S. is used for automobiles and other types of transportation. Per passenger mile, cars are less than one-half as efficient as buses, and airplanes are only one-fifth as efficient as buses.

Much heat is lost by buildings which are poorly insulated. Appliances consume varying amounts of power, measured in watts. Electrical energy is not nearly as efficient as burning fuels directly. It requires twice as much fuel to heat electrically as by gas or oil.

We are all part of the "energy crisis", because in our daily lives we use great amounts of energy, much of which we are unaware of. It is the individual's responsibility to become aware of individual energy consumption, and consciously curtail consumption.

II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the conclusion of a successful encounter the student should be able to:

1. Discuss energy consumption in the school, home and community.
2. Describe energy waste in home, school and community.
3. Discuss laws passed to conserve energy. (55 m.p.h. speed limit, 68 degree thermostats in winter, 78 degree thermostats in summer)
4. Describe ways to conserve energy in the home.
5. Have an awareness and understanding of major energy producing sources in this country. Examples: water, sun, atomic, gas, and oil, coal, steam (geothermal).
6. Understand where these energy sources are found in the U.S.

B. Activities:

1. Take a walk around the school and neighborhood. Observe ways energy is used or consumed. Observe meter box and discuss its purpose.
2. In the library, research the amounts of energy various appliances use. For example: The Charlotte Observor, November 14, 1973 issue had an article on "One Family's Plan To Save Energy".
3. Illustrate one way there is an energy waste in your home, school or community.
4. In the library, research ways to conserve energy. For example: turning off lights when they are not in use, or turning off the TV and any electrical toy when you are not using them.
5. Discuss new laws passed to conserve energy.
6. Look at filmstrips entitled: "Wealth in Oil", "Oil: From Earth to You", "Water Pressure at Work", and "A Visit to Yellowstone National Park".
7. Locate on a large class map of the U.S., energy sources -- oil, coal, steam (earth), nuclear sources, gas (natural), and major dams (hydroelectric).

III. VALUES CLARIFICATION

A. Values Judgement:

1. Ask the students to make a list of at least twenty items at home that use electricity. Beside this list draw five columns and label, Very easily, Easily, With some difficulty, With great difficulty, and Impossible. Ask the students to check the column which best describes their attitudes. There are no right or wrong answers.

B. Rank Order:

1. If you were rushing out to school, and had a chance to do one thing before leaving, how would you rank the following:
   a. Make up your bed
   b. Turn the light in your room off
   c. Water a plant
2. If you were eating breakfast, and needed more light, how would you rank the following:
   a. Turn on the overhead light
   b. Open the shutters or draperies
   c. Eat in the dark
3. If you were in a classroom that was 68 degrees, and you were cold, rank the following:
   a. Push the thermostat up
   b. Put on a sweater
   c. Complain
4. If you needed to go to the shopping center which was near your house, how would you get there? Rank the following:
   a. Get your mother to take you
   b. Walk
   c. Ride your bike
5. If your father works downtown and is thinking of the best plan for getting there, rank the following:
   a. Drive alone in his car
   b. Join a car pool going downtown
   c. Get his wife to take him and pick him up daily

C. Continuum:

1. Since you have learned about energy consumption, mark your family as to how they feel about energy conservation.

IV. RESOURCES

Pamphlet:

North Carolina Public Schools, Vol. 38, No. 3, 1974.

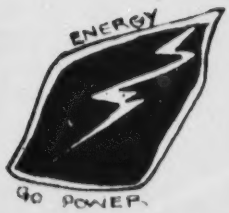
Newspapers:

"Help a Bunch During the Fuel Shortage", Mini Page, January 28, 1974.
"One Family's Plan to Save Energy", The Charlotte Observer", November 14, 1973.
"Why the Energy Shortage?", Mini Page, January 28, 1974.

Filmstrips:

"Wealth In Oil", Ency. Brit.
"Oil: From Earth to You", The American Petroleum Institute.
"Water Pressure at Work", Filmstrip of the Month Club.
"A Visit to Yellowstone National Park", Eye Gate House.

FUEL AS ENERGY



Grades 5 and 6

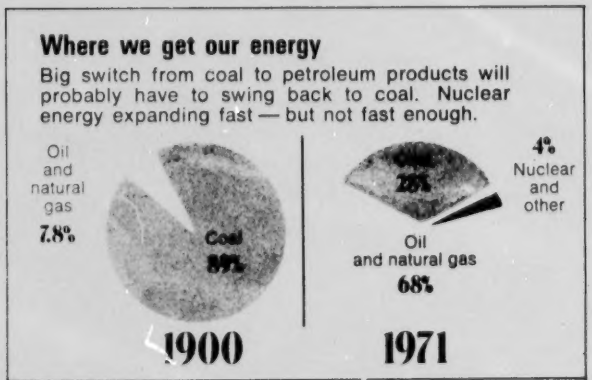
I. INTRODUCTION

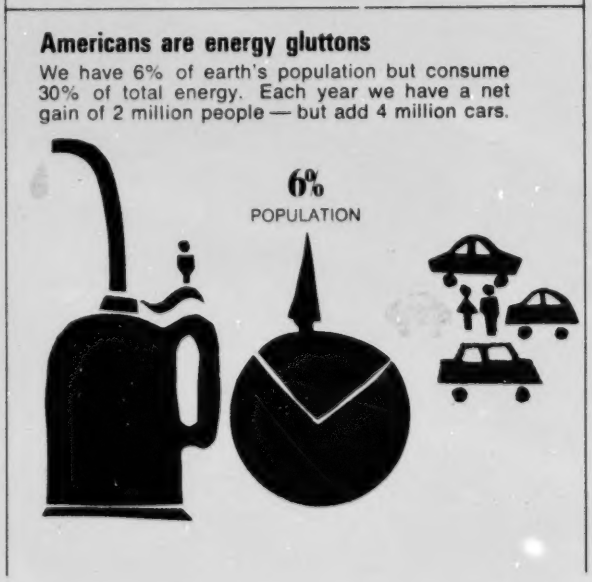
From prehistoric times man has been dependent on his ability to turn energy into power. Most of man's energy, and hence power, comes from the sun. The fossil fuels: coal, oil products and has were once living plants and animals, which trapped the sun's energy by the process of photosynthesis. Fossil fuels are being produced now but the rate of production is so slow that they are classified as non-renewable resources. Uranium, which is used in the production of nuclear power, is produced by the decay of radioactive elements in the earth's crust and is also subject to depletion.

Man's rate of consumption of energy has increased tremendously since the advent of the industrial revolution. Between 1950 and 1970, U. S. consumption of energy resources doubled with an annual average growth rate of 3.5 per cent--more than twice the population growth rate. Here are some interesting statistics: Americans consume for air conditioning the same amount of power that all 800 million Chinese need for everything. Energy used is this country is distributed for: Transportation 25%, Residential 11%, Industrial 42%, and Business 14%.

One-fourth of the enrgy is turned into electricity before it is used by consumers. Electrical energy is wasteful as compared with the use of the fuel irself. When fuel is utilized to generate electrical power, only one-third of the fuel energy becomes electricity. For example, the electrically heated home requires about twice as much fuel per unit of heat as the gas or oil heated home.

On the spaceship earth, non-renewable fuel resources are considered to be finite. Supplies of coal in this country should last for several hundred years, but gas and oil supplies are not as abundant. Research indicates that we must carefully consider our use of gas and oil as known reserves in this country are in very short supply.


Where we get our energy
Big switch from coal to petroleum products will probably have to swing back to coal. Nuclear energy expanding fast — but not fast enough.
Oil and natural gas 7.8%
Coal 88%
1900
Oil 28%
4% Nuclear and other
Oil and natural gas 68%
1971


Americans are energy gluttons
We have 6% of earth's population but consume 30% of total energy. Each year we have a net gain of 2 million people — but add 4 million cars.
6%
POPULATION

To protect ourselves from shortages we must not only instigate governmental regulations, but we must push the nation into a new "energy conservation ethic." One of the first steps is efficiency requirements for the automobile which consumes a disproportionate amount of energy. In the long run, entire patterns of transportation will have to be changed. Per passenger mile, cars are less than one-half as efficient as buses and airplanes are only one-fifth as efficient as buses.

Much heat is lost because buildings are poorly insulated. Perhaps homeowners will have to backfit their homes with new insulation.

When we buy appliances we must come to think of how much energy the appliance consumes. Surveys have shown that when two air conditioners which advertised the same cooling power were compared, one required twice as much energy as the other, apparently to do the same job.

Alternatives must be weighed by city, county and state governments, and by individuals. We cannot afford to waste energy.

II. ENVIRONMRNTAL ENCOUNTER

A. Behavioral Objectives:

At the conclusion of a successful encounter, the student should be able to:

1. Explain the source of the various types of energy used in our daily lives, i.e. electricity, heating, and transportation.
2. Describe the difference between renewable and non-renewable resources.
3. Discuss the advantages and disadvantages of using electricity as opposed to using primary fuels.
4. Discuss wasteful uses of energy.
5. Suggest methods of conserving energy

at school, at home and in the community.

B. Activities:

1. Survey the uses of electricity at home. What items use electricity? Could primary fuels be substituted? Each student can draw a home diagram and place all the items they can find. Have the class compile a list of these. Quiz the class and use a red dot to indicate whether most feel the item can be stopped, a yellow dot can show limited use, and no mark meaning it is considered necessary.
2. Visit a service station. Survey transportation on a busy street. Investigate the energy used by automobiles and other forms of transportation. How many people generally ride in one automobile? What is the average horsepower and rate of gasoline consumption of the automobiles surveyed? How could the energy consumed by automobiles be reduced? How is gas milage affected by the condition of the automobile's engine? How could the fuel used for transportation be reduced? What alternative methods of transportation could be used (bicycles, mass transit)? Is the mass transit system in Charlotte convenient? Why or why not? How will fuel shortages affect mass transit systems?
3. Contact local fuel companies. Gather information on sources of fuel. Are fuels considered to be renewable or non-renewable resources? Why? What are some of the problems associated with providing fuel in the United States? Is the rate of fuel consumption going up or down? Which fuels are in the shortest supply?
4. Study how electricity is produced, and visit a power plant if possible. What is the difference between a hydroelectric power plant, a fossil fuel plant, and a nuclear plant? Discuss each as to advantages and disadvantages to living things? How does the electricity come to your home?
5. Plan a campaign to cut down on daily fuel use at school and at home. Encourage the conservation of energy. The class can make a large newspaper for hall display. It may be labeled, N-ER-GEE. Write articles, editorials, cartoons, etc. on conservation. The class can also make posters with "catchy" slogans or cartoons. Try making display cards such as light switch slogans - "Cut Off - Save a Watt of Energy!"
6. Investigate alternative methods of producing electricity. Children can collect articles in newspapers and magazines on geothermal energy, solar power, wind power, and using wastes for burning. Each can share these with the class. Discuss each if it is renewable or non-renewable. Advantages and disadvantages of each.
7. Children can study fossil fuels. They can draw the stories of formation and all the uses they can find for coal and petroleum. Are these renewable? What problems are involved in getting these fuels? Articles on strip-mining and oil shale can be discussed. How are we using these fuels? Are they in short supply?

   Cartoons on the energy crisis can be collected or drawn. Each can choose one to show on an opaque projector. Explain how it uses humor to make a point.
8. Survey the school. How is the school heated? Discuss insulation. What is the monthly electric bill? Heating bill? Is the school heated at night? On weekends? Are there wasteful uses of energy? The class can visit the heating system. Discuss and compare with other heating systems.
9. Have the class collect news headlines and articles on energy. How is transportation affected by the crisis? Business? What measures of conservation or regulations are suggested? Which ones do they use at home? At school?
10. Study how engines use energy to produce motion and power. Investigate the energy used by cars and other transportation. Make a survey of gasoline consumption in chart form as each student reports on the kind of car and the gas per mile consumption. How can this be reduced? What other methods of travel could be used?

III. VALUES CLARIFICATION

Use techniques outlined in the Introduction for "Valuing the Environment."

A. Continuum:

1. If you were to build a home at the lake, and were told that the power plants used coal, where would you place yourself?
2. If you were to build a home at the lake and were told that the power plants used nuclear energy, where would you place yourself?

Continuum contd.

Brave Bill _____ Fraidy Phil

B. Values Voting:
1. Do you think we need an air conditioner?
2. " " " " " a toaster?
3. " " " " " an electric doorbell?
4. " " " " " an electric stove?
5. Add those suggested in survey of home electrical items.

C. Values Grid:
1. Ask the students to suggest problems such as gas shortage, nuclear power, heating fuel, etc. List them on a chart similar to the one below, and mark them according to the following directions:
Column 1. Check those that you are concerned about. Discuss the problems and how you feel or stand on each.
Column 2. (After one or two days) Check those that you have talked about to others out of class.
Column 3. Check those that you have thought about carefully. Discuss if feelings or stands have changed.
Column 4. Check those that you have acted on or done anything about your belief.
Column 5. (After several days) Check those that you have repeatedly acted upon.

Problems	1	2	3	4	5	What is your feeling or stand?
1.						
2.						
3.						
4.						
5.						

D. Alternative Search:
1. On a large school diagram ask the children to list ways that they think energy can be saved, such as partial lighting, less heating, etc.

E. Role-Playing:
1. "News to Choose" -- Children can choose and act out six o'clock news interviews. Headlines can be cut and pasted on cardboard. On the back list the participants, such as the reporter, service station owner, etc. Invent your own headlines or use those from newspapers and other sources.

F. Rank Order:
Rank the following according to your values judgement:
1. If your family were to buy a new car, which would you consider?
_____ Size and optional features.
_____ Gas consumption per mile.
_____ Space and uses for family.
2. If you were to pick up a few items at the shopping center, which method of travel would you use?
_____ Walking
_____ Riding a bike
_____ Riding a car
3. If you wanted to go to the skating rink on Saturday, which would you choose?
_____ Car pooling
_____ Mass transit (bus)
_____ Family car

Rank Order contd:

4. If Americans must save even more gas, which do you think you would choose?
   _____ Buy an electric car
   _____ Ride a bus
   _____ Buy a motorcycle

IV. RESOURCES

Books:

The Social Sciences Concepts and Values, Brandwein and others, Harcourt Brace, 1970.
Science 5, & Science 6, Mallison, Mallison, Smallwood; Silver Burdett, 1968.
Concepts in Science, Paul F. Brandwein; Harcourt, Brace and World, Inc., 1969.
Today's Basic Science, Navarra and Zafferoni; Harper Row, 1969.
People and Their Environment, Matthew J. Brenner; J. G. Ferguson Publishing Co., 1972.
Clarifying Values Through Subject Matter, Harmin, Kirschenbaum, Simon; Winston Press, 1973.

Magazines:

"Ranger Rick's Nature Magazine", National Wildlife Federation Inc., 1412 16th Street N.W., Washington, D.C., 20036, January, 1973.
"Audubon", National Audubon Society, 950 Third Ave., New York, N.Y. 10022, January - December, 1973 & 1974.

Films:

The Energy Challenge - Screen News Digest, 16mm., color, 26 min.
Energy: The Dilemma, Churchill, 16mm., color, 20 min.
Energy: New Sources, Churchill, 16mm., color, 20 min.
Energy: Less is More, Churchill, 16mm., color, 18 min.
Energy: Nuclear Alternatives, Churchill, 16mm., color, 20 min.

TREES

Grades I and 2

I. INTRODUCTION

Trees are a living natural resource. From the earliest times trees furnished shelter, homes, furniture and countless articles and accessories for settlers.

In the city, trees interact with the living as well as with non-living elements of the environment. In the past, trees were recognized primarily for their shade and aesthetic value. Today, they are associated with many other ecological and human values.

Trees protect the soil and aid its water holding capacities.

Trees serve as windbreaks, reducing wind velocities and filtering out dust and other airborne particles.

Trees serve as air conditioners, moderating extremes in temperature. They absorb reflections from masonry, asphalt, and steel, reducing heat and glare.

Trees serve as fences to divide property. They act as buffers which absorb noise, especially between streets and homes.

Trees harbor wildlife.

And trees beautify the land, emit pleasant odors, provide color, size, and pattern and provide a sense of privacy and security.

II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the completion of a successful encounter, the student will be able to:

1. List several reasons for having trees in the city.
2. Describe uses of trees in the area immediately surrounding the school.
3. Suggest where additional plantings might be beneficial.

B. Activities:

1. Take a walk around the school ground and the immediate neighborhood. How does the temperature differ in tree-covered areas and in areas covered by pavement? Where are trees used as dividers? As noise buffers? Smell different kinds of trees. How does man injure trees? (Compacting the soil so roots can't get air and water, physically injuring them with machinery, subjecting them to automobile exhaust, etc.).
2. Take a tree inventory. Examine leaves closely. Why are some leaves "dirtier" than others? How do the trees improve the environment? What areas need more trees? Who takes care of the trees at the school? Observe leaves several hours after a rain. Are the leaves still wet? How does this help control water runoff and erosion? What do these trees contribute to the environment? Where would students like to have trees? What trees require a great deal of care? (hedges, shaped trees, etc.) Does this increase their usefulness? Where are there very few trees? (shopping centers, downtown) How does a lack of trees affect these areas?

III. VALUES CLARIFICATION

A. Values Voting:

1. How many of you have planted a tree?
2. How many have seen a city tree cut down?
3. How many have sat in the sun waiting for someone?
4. How many like parking lots?
5. How many have smelled a tree?

B. Continuum:

1. When you play on a hot sunny day, would you choose to play with Shady Sam who plays on grass shaded by trees or Concrete Clyde who chooses to play on a treeless sidewalk?

C. Rank Order:

1. What do you think is the most important use of trees? Rank the choices 1 - 4.
   a. Shade
   b. Wood
   c. Homes for wildlife
   d. Beauty

IV. RESOURCES

Books:

The True Book of Trees, Illa Podendorf, Childrens Press, Chicago, 1954.
Junior Science Book of Trees, Robert S. Lemmon, The Garrard Press, Champaign, Illinois, 1960.
Thanks to Trees, Irma E. Webber, William R. Scott, Inc., New York, 1952.

Filmstrip:

"A Tree Is Nice", Weston Woods, color.

Films:

"Trees and Their Importance", Color 12 minutes, 1966, Ency. Brit.
"A Tree Is a Living Thing", Color, 11 minutes, 1964, Ency. Brit.

POLLUTION IS WASTEFUL

Grades I and 2

I. INTRODUCTION

Pollution has been defined as "a resource out of place." The statement points out two interesting ideas; i.e., that pollution is wasteful and that humans are wasteful.

Even the earliest cavemen threw things away. They discarded tools, charred food, and broben pots. Well-preserved garbage dumps show us what our ancestor's lives were like. Most of what was thrown away was organic and was quickly recycled by the earth's own recycling process. Their lives were simple and their waste disposal problems were few.

A glance in any direction in any city reveals many signs of man's waste: air pollution, automobile exhaust, litter, water pollution. Man disposes of wastes in the air, in the water, and on the ground. The cost of clean-up is high. Many wastes cannot be easily reused. Technology is beginning to learn how to control polluting wastes. The next step will be to reuse the wastes.

Some steps have already been made. The black soot which once poured from the stacks of pwer generating plants can be trapped. The material is called fly ash. Fly ash is now being tested as a component of glassphalt, a substitute for asphalt, and contains some fly ash and glass cullet.

Present ways of disposing of trash are archaic and wasteful. They pollute the land with litter, the air by burning, and even the water. Landfills where the wastes are covered with soil daily and sometimes illegal dumps are the most common disposal sites. Dumping of trash can be expensive and wasteful. Several cities are experimenting with methods of using trash rather than throwing it out. Several cities plan to recycle metals paper. A handful of cities are drying organic wastes, mixing them with coal, and using them as fuel.

II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the conclusion of a successful encounter, the student should be able to:

1. Describe examples of wastes in the air, in the water, and on land.
2. Discuss how pollution is really a waste of our resources.
3. Discuss where trash comes from, such as: excessive packaging, throwaways, wasteful habits etc.
4. Discuss several methods of disposing of trash such as burning, littering, illegal dumping, transporting to sanitary landfills, etc.
5. Discuss the problem of disposing of materials which are not broken down by nature such as glass and aluminum.
6. Suggest ways of cutting down on the amounts of trash which we must throw away.
7. Suggest ways of reusing trash such as recycling, using trash as fuel, etc.

B. Activities:

1. Take a walk around the school grounds. Note examples of waste, litter, water pollution (even in puddles), air pollution (exhaust from autos). LIst the examples of pollution when you return to the classroom. Ask students to guess where the wastes come from. What will happen to wastes on the ground, in the water, and in the air? Which wastes will nature dispose of naturally? Which will man dispose of? How are wastes and pollution related?
2. Note where classroom and cafeteria wastes go. Draw pictures of wastes on the ground, in the air, and in the water. Suggest how specific wastes can be reduced, controlled, or reused in the classroom or at home.
3. Write a letter to the sanitation department to find out how much money the community spends yearly on trash collection.
4. Initiate a clean-up campaign in the room--make posters to encourage clean-up.
5. Examine the waste disposal system of the school. Make suggestions for cutting down on wastes in the classroom and/or at home.
6. Make and use a litterbag for use on the playground.

III. VALUES CLARIFICATION

A. Values Voting:

1. Do you like to see empty cola bottles in a lake?
2. Do you like to see litter free yards?
3. How many of you feel you should teach others to pick up litter?
4. How many of you feel it is your duty to take out the trash at your house?

5. How many think littering is wasteful?
6. How many usually like electric toys better than toys which are not electric?
7. How many use paper towels at home rather than a reusable, washable towel?

B. Rank Order:

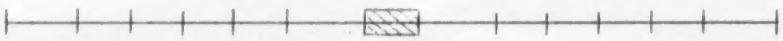
1. If you saw three candy wrappers on the way home from school, how would you rank these plans of action? Rank them 1 - 3.
   a. Leave them alone.
   b. Pick all three up, and put in first garbage can you see.
   c. Pick up only one wrapper, and roll it up and throw it to the child walking ahead of you.
2. If you were walking with some friends and one of them threw down a candy wrapper, how would you rank these plans of action? Rank them 1 - 3.
   a. Leave the paper alone.
   b. Pick up the paper.
   c. Explain to your friend why paper should not be thrown down.
3. If you have a broken toy, what would you do? Rank them 1 - 3.
   a. Have it repaired.
   b. Throw it away.
   c. Just leave it in your room.
4. If you had a pile of old newspapers, what would you do?
   a. Draw and paint on them.
   b. Save them for the paper drive.
   c. Throw them away.
5. If you could choose what to do with your cafeteria milk cartons, what would you do? Rank them 1 - 3.
   a. Throw them away.
   b. Plant something in them.
   c. Save them for the paper drive.

C. Continuum:

1. How many:

Always buy returnable soft drink bottles Always buy throwaway soft drink cans and bottles

2. At parties in your home, does your family usually use paper plates and utensils or washable, reusable plates and utensils?

Reusable  Throwaways

3. You can walk to a park two ways. The longer path takes you by a pond with ducks swimming in it. The shorter path takes you through an ugly part of the city littered with trash. Which way would you go?

Longer path Shorter path

IV. RESOURCES

Films:

"Environmental Action #2 - Man Changes In The Earth", The Creative Teacher, 16 mm.
"The Litterbug", Color, 8 minutes, primary-elementary, Disney, 1962.

Filmstrips:

"America's Urban Crisis", Society for Visual Education.
"Solid Waste: A New Pollutant", Society for Visual Education.
"Water Pollution: A Complex Problem", Society for Visual Education.
"The Air Pollution Menace, Society for Visual Education.

Transparency:

Pollution, Conservation Science Series, Hubbard Scientific Company, NOrthbrook, Illinois (student level).

Books:

Environment and Man, Richard H. Wagner, W. W. Norton and Company, 1971.
Teacher's Curriculum Guide to Conservation Education, People and Their Environment: Grades 1 - 2 - 3, Matthew J. Brennan, J. G. Ferguson Publishing Company, Chicago, Illinois.
Pollution, D. F. Wentworth, J. K. Couchman, J. C. MacBean, A. Stecher, Mine Publications, Inc., 1971.
The Air We Breathe, Enid Bloome, Doubleday and Company, Inc., Garden City, N. Y., 1971. (student level).
Our Dirty Air, Sarah M. Elliott, Julian Messner, A Division of Simon and Schuster, Inc., 1 West 39 Street, New York, N. Y., 1972. (student level).
Clean Streets, Clean Water, Clean Air, Cynthia Chapin, Albert Whitman and Company, Chicago, 1970. (Student level).
An Introduction to Pollution, Harold E. Schlichting, Jr. and Mary Southworth Schlichting, Steck-Vaughn Company, Austin, Texas, 1972. (Teacher level).

Grades 3 and 4

AWARENESS OF NATURAL VERSUS MAN MADE ENVIRONMENT

I. INTRODUCTION

Your environment is made up of many places--your home, your school, your playground, city hall, parks, streets--your neighborhood and your city are part of your environment. All of these places have been built by man. Some were created using materials provided by nature: trees and plants, rocks and minerals. Some were created by using man-made materials: plastics, aluminum, asphalt.

The city is a complex environment--buildings, streets, parks, pipes, wires, and systems--built to provide human life with considerable comfort. Man builds to satisfy his needs for survival, convenience, and comfort. Consider all the things we put into the city to support human life. What parts are added primarily for comfort?

There is a difference between the experience of walking slowly through a town, having time to notice things in detail, and driving through at 40 m.p.h. At higher speeds only the most important things are likely to catch your eye.

Two hundred years ago there were no highways, movie theatres or baseball parks. Today there are no forts, no blacksmiths and very few stables. The buildings and cities we live in are different from building and cities of the past. Man is continually changing the environment. The environment we build depends on our way of life. Change is natural. Even though man's needs stay the same, the way we meet these needs changes. For instance, there has always been a need to get from one place to another, but since the invention of the automobile, the environment has changed completely.

II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

The student should be able to:

1. Define environment--natural and man-made.
2. Identify areas of natural and man-made environment in the community.
3. In the natural and man-made environment, identify areas of plant and animal life, temperature changes, noise changes, aesthetic differences, visual pollution.
4. Plan a course of action to help create a more natural environment in man-made areas.

B. Activities:

1. Take a 20 minute walk in your neighborhood--walk slowly--keep your eyes open. Make a diary of your walk.

Where I Walked _____ Date _____

Man-made things I saw _____

_____

_____

Natural things I saw _____

_____

_____

I think my neighborhood has (check one) very few people ____ too many people ____ a medium number of people ____.

My neighborhood is (check one) open and full of light ____ is shady with trees ____ is crowded with buildings but also has open space, light and trees ____.

The area I live in is (check one) urban (city) ____ suburban (city outskirts) ____ small town ____ rural (country) ____.

What I like about my neighborhood _____

_____

_____

_____

What I would like to change or improve about my neighborhood _____

_____

2. Investigate the school site and surrounding areas.
3. Tie the ends of a 3-foot rope together. Spread the rope in a circle on a grassy area. Count the life in this area. Fill in lists.

Plants	No.	Animals	No.
Clover		Beetles	

What would the results be if you did it in an area paved or disturbed by man?

4. Record temperatures in many different kinds of places. Add to the list provided.

Temperature Record	Date
Official weather bureau temp.	
1" above sunny sidewalk	
1" above grass in sun	
10' above grass in sun	
Under thick-leaved tree	
In 6" deep hole in the ground	

5. List noises heard in natural and man-made environments. Compare and discuss.
6. Collect pictures of visual pollution at the shopping center and compare to other parts of the city, state and country.
7. Walk around the school and record feelings in a diary.

Walk Diary

Where _____ Date _____

Small sounds I heard _____

Small things I found _____

Things I liked the best _____

Observations

Changes Caused by Nature	Changes Caused by Man

8. Draw a picture of what you think your neighborhood will look like in the future.
9. Use kit "The City" offered through the Charlotte Nature Museum.

III. VALUES CLARIFICATION

A. Role Playing:

1. Pretend you are a city planner with all money available and plan your city to help the townspeople to live happily.
2. Pretend you are a housing expert. Your town has asked you to redesign your neighborhood. Write and draw changes you would make.
3. Two designs--which do you like best? Why? Expand other designs.
   1. 2.

B. Values Voting:

I believe:

1. That if I cut down a tree it will do no harm.
2. The smog in Charlotte is not dangerous because nobody has died from it yet.
3. Putting candy and gum wrappers into trash containers is one way to help prevent pollution.
4. Traffic causes too much noise.

5. People create many environmental problems for themselves.
6. It is cooler under the umbrella at Hardee's.
7. My neighborhood is attractive.
8. Man-made beauty is better than natural beauty.

C. Rank Order:

1. Rank the following, listing the most beautiful first.

a. Open meadow	a. Tall building	
b. Vacant lot	b. Shopping center	
c. Landscaped building	c. House	

2. What makes you feel the best?
   a. Fresh air
   b. A chance to play in pleasant natural surroundings
   c. Clean home and neighborhood
   d. Nice view from your window
3. Which do you prefer?
   a. Place to be alone
   b. Place to go to movie
   c. Clean pretty school with interesting equipment
   d. Nice view from your window
4. Which would you rather have in your neighborhood?

a. Offices	a. Office	a. Shops
b. Factories	b. Shops	b. Parks
c. Stores	c. Outdoors	c. Houses

5. Which would you rather have next door to you?
   a. Park
   b. Drive-in movie
   c. Vacant lot
   d. Business

D. Discuss or debate:

Give reasons and examples as to why you feel this way.

1. Does the environment make people the way they are?

or

2. Do people make the environment the way it is?

E. Composition:

Pretend you are an author and write a story about your neighborhood in the year 2020.

F. Continuum:

Mark your position.

Cabin Robin Porky Yorky

Where would you rather live?

Robin wants to live alone in a cabin at the top of a mountain with no road leading to it.

Porky wants to live on the top floor of a 50 story high rise apartment in the middle of New York City.

IV. RESOURCES

Pamphlets:

"First Follow Nature", Scholastic's Earth Corps Environmental Awareness Book 2, Maureen Hunter, Scholastic Book, New York, 1971.

"You and Your Environment", An Ecology Program, W. S. Houston, Part 2 American Education Publication, Columbus, Ohio, 1971.

Books:

Concepts in Science: Grades 2 - 3, Harcourt-Brace-World.

Today's Basic Science: Grades 2 - 3, Harper Row

Science: Grades 2 - 3, Silver Burdett
Science Workbook: Grades 2 - 3, Golden Book
Teacher's Curriculum Guide to Conservation Education, M. J. Brennan, J. G. Ferguson Publishing Company, Chicago, Illinois, 1968.

Kit:

"The City", Match Program, Children's Museum, Boston, American Science & Engineering, Inc. (available from the Charlotte Nature Museum.)

Films:

"Nature's Half Acre", Color, Walt Disney, C, 33 minutes.
"Beaver Valley", Color, Walt Disney, 32 minutes.
"Living and Non-living Things", CORF.

URBAN SOIL USE OR MISUSE

Grades 3 and 4

I. INTRODUCTION

Man is linked closely with the land. His very sustenance depends on the fruits of the land. But man's use of the land often becomes uncontrolled abuse of the land. Since his intervention, soil erosion has increased two and one-half times what it was before. It is estimated that 24 billion tons of material are moved annually by rivers to the earth's oceans. It takes only a few years for it to be washed uselessly downstream or to the oceans.

For many years after the disastrous soil losses during the 1930's the U. S. Soil Conservation Service's mandate was to deal with losses of agricultural top soil. Increasingly they are turning their efforts to urban soil problems as well. Research indicates that sediment eroded from areas undergoing suburban development can be as much as 50 to 500 times greater than in rural areas. For the Baltimore and Washington metropolitan areas, the annual sediment production is estimated to be one to two tons per person increase in population.

Erosion involves both the removal or detachment of soil particles and the transportation or soil particles by water. Removing surface vegetation decreases cohesive forces between soil particles and exposes the soil directly to the erosive force of moving water.

Land erosion is also increased by the amount and the speed of runoff water. The amount and speed of urban runoff is increased by waterproofing surfaces and removing vegetation.

The consequences of soil erosion are many--loss of productive agricultural land in rural areas and silt clogged streams and lakes. Of the four billion tons of sediment eroded in the United States each year, an estimated one and a half billion tons ends up in the nation's reservoirs. Reservoir storage capacity is decreased and the Government must spend millions annually to dredge harbors and waterways to keep them navigable.

II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the conclusion of a successful encounter, the student should be able to:

1. Identify examples of erosion on the school grounds, in the neighborhood and in the community.
2. Explain the causes of soil erosion in urban as well as rural areas.
3. Discuss the impact of soil erosion on streams, lakes and reservoirs.
4. Plan and carry our simple erosion control techniques.

B. Activities:

1. Walk around the school and into neighboring areas. Draw a map of the area covered and record results of the investigation on the map. Record areas where erosion is a problem. At each stop suggest why erosion is occuring (construction, vegetation worn thin by traffic, neglect, etc.). Record areas which are waterproofed (cement, asphalt, buildings, etc.). How does rain water run off the water-proofed area? Where does it go? What does it carry with it (oil, gasoline, rubber pieces, etc.)? Record areas covered by natural vegetation. Does erosion occur in these areas? Why? Where does rain water go? Walk the area again after a heavy rain storm. Look for evidences of erosion and other results of moving water. Are there drainage ditches in the area which are only full after a heavy rain? Where does this water go? Collect samples of different types of soil and other ground cover. Collect in a large clear glass jar water running off an exposed bank and off of a grassy area. Compare the two. Does more water run off faster on the paved area, the area covered with vegetation or the exposed area? How could erosion be controlled?
2. Contact the Soil Conservation Service. Ask a representative to visit the school and walk the grounds and the neighborhood with the students. Discuss soil problems with the representative. Where is soil erosion a problem in Mecklenburg County? On a map of the County record county creeks. Indicate problem areas. Request information on the new sedimentation law. Developers must make provisions to prevent soil from washing from the construction site. How will developers prevent soil erosion?
3. As you cover the school area, see where erosion has been checked. See how we cause bare spots on our grounds. As you drive around Charlotte with your parents, note problems associated with soil erosion. What color are rivers and creeks after a heavy rainstorm? Why? Record areas of exposed soil on a map. Why are these

areas exposed?

4. Choose one area where soil erosion is a problem. Propose several solutions for solving the problem. Carry out the plan. For example, cover a small area with grass seeds to show how this helps.

III. VALUES CLARIFICATION

A. Values Voting:

1. Do you like to take walks?
2. Would you like to have a stream or lake in your backyard?
3. Would you visit a lake if it were close to you?
4. Have you ever been out in a heavy rain storm?
5. Do you have a sandbox in your backyard?
6. Would you like to plant something of your own? (garden, flowers, grass, shrub, tree, vegetables)

B. Rank Order:

1. If you could pitch a tent anywhere you wanted for the week-end, how would you rank the following places?
   a. Parking lot
   b. Beach
   c. Backyard
   d. Park
2. You are a weatherman and can control any of the following patterns for a complete day. How would you rank them?

a. Snow storm	Rain	Snow
b. Rain storm	Snow	Rain
c. Hail	Sleet	Cloudy
d. Tornado	Hail	Clear

3. You have been given some land to use in any way you want. How will you rank them?
   a. Grazing land
   b. Department store
   c. Mining
   d. Natural

C. Composition:

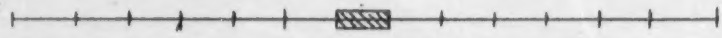
1. On the wheel write how you feel when you see signs of erosion. Examples:
   a. On the school grounds
   b. In your own yard
   c. Grand Canyon
   d. Along road sides

D. Discuss or Debate:

1. Pretend you have a vacant lot next door to you and can do anything you want to with it. What would you plan?

E. Continuum:

1. Mark your position. Dirty Gerty thinks everything should be dirt covered--including roads--not even any grass. Ashley Asphalt thinks everything should be covered with asphalt.

Dirty Gerty  Ashley Asphalt

IV. RESOURCES

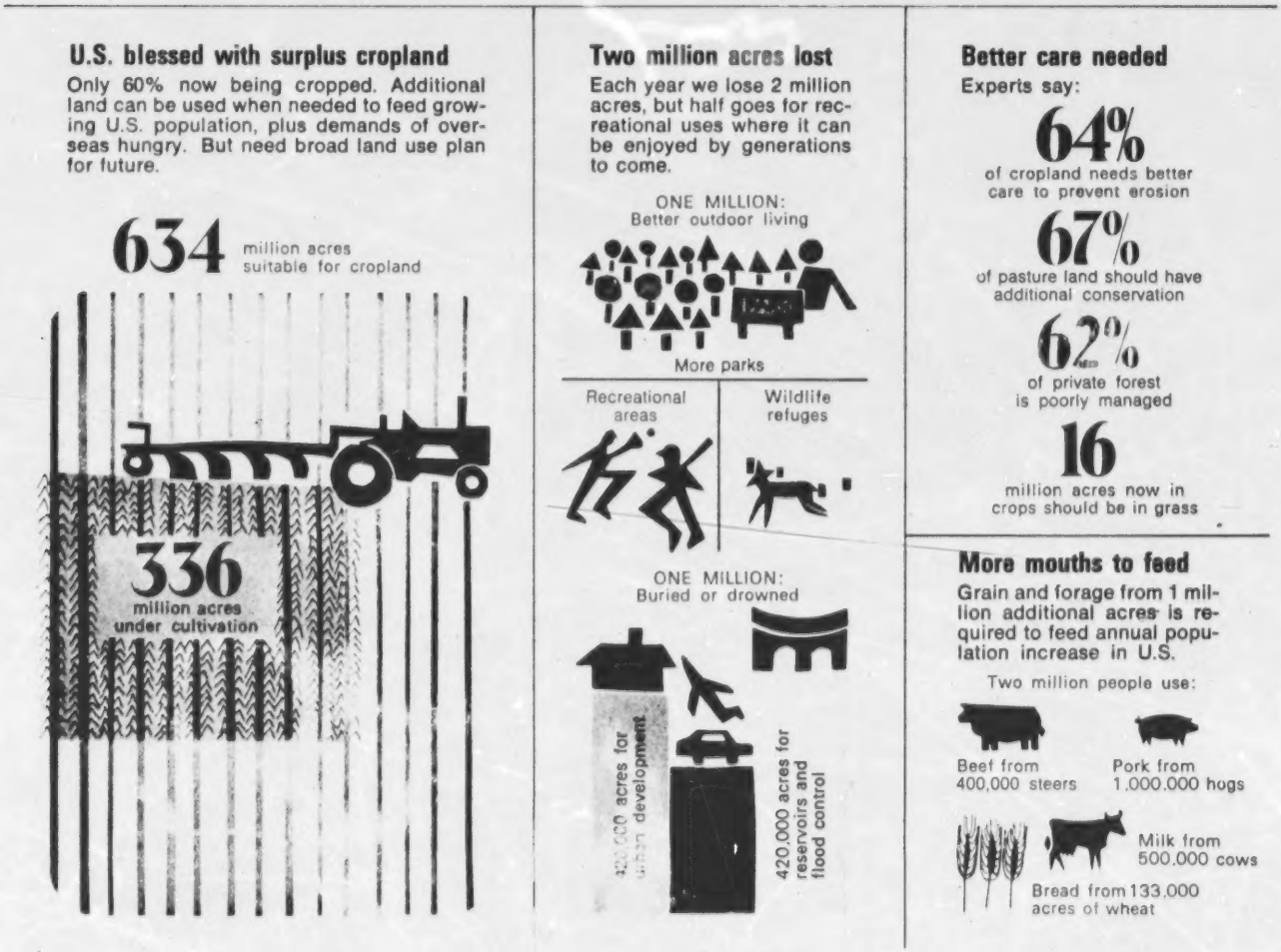
Books:

Concepts in Science, Book 3, Harcourt Brace & World, 1966.

Clarifying Values Through Subject Matter. M. Harmin, H. Kirschenbaum, S. Simon, Winston Press, 1973.
People and Their Environment, (Teacher's Curriculum Guide to Conservation), Matthew J. Brennan, Ferguson Publishing Company, 1968.
Science 3, Silver Burdett, 1968.
Science Far and Near, Herman and Nina Schneider, D. C. Heath, 1964.
Soil Conservation, Terry Shannon, Melmont, 1963.
Urbanization and Environment: Physical Geography of the City, T. R. Detwyler, M. S. Marcus, Duxbury Press, 1972.

Films:

"Adventures of Junior Raindrop", SCS, USDA.
"The Lamb and Bluebells:, CORF.
"Soil Conservation Today", Society for Visual Education.
"Our Soil", Coronet.
"Soil and Water Conservation", Heath, black and white, 10 minutes.
"Water", CMC, color, 14 minutes.


U.S. blessed with surplus cropland
Only 60% now being cropped. Additional land can be used when needed to feed growing U.S. population, plus demands of overseas hungry. But need broad land use plan for future.
634 million acres suitable for cropland
336 million acres under cultivation
Two million acres lost
Each year we lose 2 million acres, but half goes for recreational uses where it can be enjoyed by generations to come.
ONE MILLION: Better outdoor living
More parks
Recreational areas
Wildlife refuges
ONE MILLION: Buried or drowned
420,000 acres for reservoirs and flood control
Better care needed
Experts say:
64% of cropland needs better care to prevent erosion
67% of pasture land should have additional conservation
62% of private forest is poorly managed
16 million acres now in crops should be in grass
More mouths to feed
Grain and forage from 1 million additional acres is required to feed annual population increase in U.S.
Two million people use:
Beef from 400,000 steers
Pork from 1,000,000 hogs
Milk from 500,000 cows
Bread from 133,000 acres of wheat

RECYCLING-RUNNING IN CIRCLES

Grades 5 and 6

I. INTRODUCTION

Nature creates no junkpiles, but the same cannot be said for man. Any neighborhood will tell the story--buldging trash barrels behind each home, each store, each place of business. Americans throw away more than many nations manufacture. We live in a disposable society--throwaways, excessive packaging, paper, plastics, and cardboard. In 1920, the average household produced approximately two pounds of garbage each day. Today, on the average, each person produces more than five and one-half pounds per day. By 1980, it is estimated that the amount will be eight pounds per person per day.

These wastes, solid wastes, trash and garbage, must be disposed of by the individual, by the home, by the school, and by the cities. On an average, disposal of solid waste is the third most expensive municipal service. Schools and roads are the number one and two expenses.

Present disposal methods are archaic and wasteful, polluting the land with litter, the air by burning, and the water by garbage disposals. Landfills where the wastes are covered with soil daily and dumps are the most common disposal sites. Dumping of solid wastes is expensive and wasteful. Several cities are experimenting with methods of using solid wastes rather than throwing them out. Several businesses are recycling metals and paper. A handful of cities are drying organic wastes, mixing them with coal, and using them as fuel.

A symptom of our disposable society is litter--everywhere a problem which can be solved by working from two prospectives: (1) cutting down on throwaways at the source, and (2) instilling in the citizenry a reuse, remake, recycle ethic whereby individuals are conscious of wastes and make every effort to reuse and recycle them wherever possible.

II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the conclusion of a successful encounter, the student should be able to:

1. Identify sources of solid wastes, i.e., excessive packaging, throwaways, wasteful habits, etc.
2. Discuss the environmental impact of several methods of disposing of solid wastes, i.e., burning, littering, dumping, transporting to sanitary landfills, etc.
3. Discuss the problems incurred by disposing of non-biodegradeable solid wastes.
4. Describe present methods of disposing of solid wastes at school, at home, and in public places.
5. Suggest alternative methods of cutting down on the amounts of solid waste which must be disposed of.
6. Suggest alternative methods of disposing of solid wastes, i.e., man-made recycling, using solid wastes as fuel, etc.

B. Activities:

1. Survey the classroom. Where does trash go when it leaves the classroom? Who takes care of it? Weigh the amount of trash leaving the classroom. How could classroom wastes be reduced? What in the room could be recycled?
2. Survey the school. What kinds of trash, other than classroom trash are produced? By the office? By the cafeteria? Who takes care of these wastes? Where do the wastes go? How often are the dumpsters emptied? Weigh classroom trash. Keep a daily chart of the amounts. Could the paper wastes be recycled in Charlotte? Collected? Organize the school to save paper for a paper drive. Separate cans into: steel, aluminum, and bimetal.
3. Survey homes. How many garbage cans are filled each week? What makes up the biggest part of home wastes? Pay attention to the amount of packaging which must be thrown away. After shopping trips, examine the bags of groceries or other items. What must be thrown away? Is the packaging necessary? Write letters to several companies suggesting how they might cut down on excessive packaging.
4. Take a walk around the school community. Identify where solid wastes are disposed of--in trash cans, dempsey dumpsters, on the ground (litter), etc. Are there evidences of other waste problems--construction wastes, service station wastes (oil from oil changes), disposable plates, cups, and utensils from quick service restaurants, etc. Where do community wastes go? Are any of them recycled? Can they be burned? Does the City of Charlotte have a law against open burning? Why? Are there air pollution problems associated with burning waste? Which of the wastes will decompose naturally in the landfill? What problems are presented by materials

such as plastics, aluminum, and glass which don't decompose easily? What can be done with these types of materials (reuse, recycle)? Chart types and amounts of litter observed. Where is litter the biggest problem? Why?

5. Study ways to:
   1. Reduce the amount of solid wastes
   2. Reuse materials and items rather than throwing them away
   3. Recycle materials

   Bring clothes from home which are not being worn for the clothing closet. As the bus driver to provide a place for litter. Wage a clean-up campaign. Present facts uncovered about excessive packaging and use of disposables to other classes and to parents. Sponsor a recycling drive.

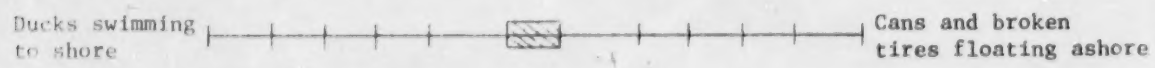
III. VALUES CLARIFICATION

A. Values Voting:
   1. How many of you drop litter when walking?
   2. How many of you are careful about keeping your yard picked up from unnecessary litter?
   3. Have you ever thrown a carton of empty cola bottles in a lake?
   4. Have you ever left the peeling of a banana near the spot of your picnic?
   5. Have you ever wrapped a gift two or three times to disguise its type?

B. Rank Order:
   1. If you saw three candy wrappers on the way home from school, how would you rank these plans of action?
      a. Leave them alone
      b. Pick all three up and put in first garbage can you see
      c. Pick up only one wrapper and roll it up and throw it to the child walking ahead of you
   2. If you were having a birthday party, how would you prefer the guests to bring the gifts to you?
      a. Wrapped colorfully
      b. Unwrapped in a brown bag
      c. Unwrapped and carried in one's hand

C. Continuum:

You can walk to a park two ways. One way takes you by a pond with ducks swimming in it. One way leads you by a pond with cans and pieces of tires around the edge. Which way would you go?



IV. RESOURCES

Filmstrips:

"Waste, A New Pollutant", Society for Visual Education, SF #5. Color.
"Environmental Action #2 - Man Changes In The Earth", The Creative Teacher. Color.

Films:

"The Litterbug", # 7900 (Charlotte-Mecklenburg School System). Color, 8 minutes. Prod. - Disney, 1962.

Books:

Environment and Man, Richard H. Wagner, W. W. Norton & Company, 1971.
Teacher's Curriculum Guide to Conservation Education, People and Their Environment: Grades 1 - 2 - 3, Matthew J. Brennan, J. G. Ferguson Publishing Company.
Pollution, D. F. Wentworth, J. K. Couchman, J. C. MacBean, A. Stecher, Mine Publications, Inc., 1971.

BICYCLE AS IF YOUR LIFE DEPENDED ON IT

Grades 3 and 4

I. INTRODUCTION

Forty years ago, 90 per cent of the U. S. public either walked, bicycled, or used public transit to get to work, schools, or shopping. At the turn of the century, the bicycle began to lose popularity to the newly created automobile. Thus, the bicycle lost its prominence and became a "child's toy" to most Americans.

In the late 60's, the American public began to rediscover the bicycle as a means of transportation and recreation. In light of the automobile's role in fuel shortages, air pollution, traffic congestion, and a less healthful society, it is apparent that some alternative transportation methods are needed.

One possible alternative is increased use of the bicycle not only as a recreational vehicle, but as a commuting vehicle as well. The bicycle offers: no pollution, low upkeep, no noise, small space use, non-congestion, healthful exercise and fun. In 1972 more bicycles were sold than new automobiles--over 10½ million.

Although the bicycle is making a comeback, in most areas it does not have the protection from its worst enemy--the automobile. Safe, marked paths, lanes or trails are desperately needed.

In Davis, California, bicycle lanes and paths were installed in 1967, and to date there have been no bike-auto accidents where the lanes are. The system is so good, 40 per cent of the commuting traffic is by bicycles. Many cities are taking steps to provide adequate scenic and recreational trails and commuting bike lanes. It is essential that cities begin to identify, acquire, and construct areas suitable for commuting and recreational biking.

The 1972 report of the North Carolina Department of Natural and Economic Resources on Resources for Trails in North Carolina, indicated that the Charlotte-Mecklenburg area should have a minimum of 175 miles of bikeways, trails, paths, or lanes. In our city where the automobile is the dominant mode of transportation, alternate means of transportation must be urged and supported in order to ease the foreseeable traffic and pollution problems.

II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

1. Discuss problems associated with present methods of transportation.
2. Discuss advantages and disadvantages of the use of the bicycle as a means of transportation.
3. Know and obey traffic regulations and safety rules.
4. Suggest how bicycling might become a safer and more acceptable means of transportation in Charlotte.

B. Activities:

1. Take a walk around the neighborhood to observe present modes of transportation.
2. Survey area residents.
   How many bicycles in each family? Types of bicycles? Age of cyclists? Most frequent bicycle trips (store, school, work, church, etc.)?
   By what means do residents make the following trips: Recreation? work? School?
   Have residents ever taken a bike ride of five miles or more?
3. Make a map of the area.
   Indicate location of bicycle owners. Plot present bicycle routes. Indicate where safe bike routes could be built.
4. Contact sources of information on bicycles; e.g., Tarheel Cyclists, Charlotte Traffic Engineers, and/or the Charlotte Police Department. Request information on bike trails, bike ways, and bike paths. Publicize the plan at the school and in the agencies.
5. Administer the Bicycle Safety Knowledge Test. Continually emphasize the importance of bicycle safety, bicycle registration and maintenance.

III. VALUES CLARIFICATION STRATEGIES

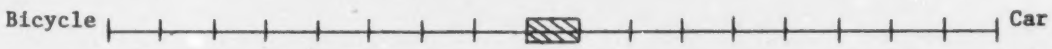
A. Values Voting:

1. How many of you would prefer to ride a ten-speed bike as compared to a mini-bike?
2. How many of you would prefer to ride your bike, rather than ride to the shopping center in a car?
3. How many of you would ride miles to Carowinds on your bike if there were a safe bike route marked out?

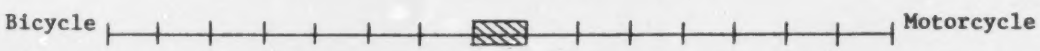
4. How many of you prefer to ride your bikes on paths and sidewalks instead of streets?
5. How many of you bicycle riders give arm signals before making turns or coming to a stop?
6. How many of you bicycle riders select routes with the fewest automobiles and slow speed traffic?

B. Continuum:

1. Where would you place yourself on these lines; if you were traveling less than one mile; between one and three miles?



2. Are you more like a bicycle or a motorcycle?



IV. RESOURCES

Consumer Resources Idea Manual developed by the Consumer Resources Environteam.
Bicycles, Charles Coombs, Morrow Publishing Company, 1972.
I'm No Fool With a Bicycle, (filmstrip), Ency. Brit., 1958, Color, Walt Disney.
Bicycles: All About Bikes and Bicycling; Care, Repair and Safety, Max Alth, Hawthorne Publishing Company, 1972.
Bicycle Safety Knowledge Test, Charlotte-Mecklenburg Schools, Environmental Education Center.

A CITY DESERT OR OASIS

Grades 5 and 6

I. INTRODUCTION

Two thousand years ago Apollodorus designed for the Roman Forum a shopping center of two levels which was enclosed and ventilated as well as lined with open front shops. In European medieval times little shops sprang up around cathedrals. By the nineteenth century, arcade architecture could be found in Milan, Italy and London, England which were covered, lined streets of shops. In the United States, the middle class migration to the suburbs after World War II and the interstate highways, looping around the cities, gave impetus to shopping centers from the strip form to the more elaborate sprawling malls.

Today four of 10 Americans are suburbanites, or some 80 million people altogether have "downtown" on their cities' fringe. In fact the city of today in form has not a single nucleus but also several satellite centers in which the suburban shoppers buy 7 per cent more than buyers in the central business district. In 1963, 68 million dollars of retail business was transacted in these centers which grew to some 123 million dollars by 1972. Land in 1950 in Seattle, Washington, one of the earliest malls, was 5 cents a square foot, but in recent years the square foot brought $6.50.

Handling some 44 per cent of retail sales, these shopping centers not only increased land values but also the varieties of services offered. A survey revealed 46 per cent of shoppers desired libraries and 22 per cent requested teen centers. The mall meant more than shopping in daily America. Competition between centers and downtown business brought bizarre consequences--everything from cemetaries to investigations by the Federal Trade Commission. Even a Supreme Court decision in 1968 in free speech centered on shopping centers. Inherent were other effects as crime increases in auto theft, shoplifting, and bank robberies; necessity for acres of free parking; and the inevitable decay of the central city with resulting social problems.

Environmentalists have just caught their breath to consider the assault on nature. What happens when 50 per cent or more of the surface of a given land area is waterproofed by asphalt? Where must all the rain and melting snow go? What happens to temperature when no soil exists for plants? What sounds fill the air besides birds chirping and rustling leaves? Are those odors from blossoms and green leaves? Where is all the metal to make suburban cars? Is there fuel enough for so many vehicles? How can goods be manufactured, wrapped, distributed, and sold in so many places? Where does one put all those cellophane wrappings, bags, strings, and trash?

II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the completion of a successful encounter, the student should be able to:

1. Understand that environmental design is necessary for a balance of nature and land use.
2. Explain the good and bad environmental features regarding shopping centers, and the like.
3. Name three land use factors that affect air quality and water quality.
4. Site examples of poor and satisfactory land management.
5. Design a small community that meets environmental quality standards for land management.

B. Activities:

1. Interview someone familiar with the use of the land before the shopping center was developed. What was the land used for? What vegetation was removed to build the shopping center? What changes followed the development of the shopping center? Street widenings? Other building centers? Could people walk to shop? Were there small neighborhood groceries in the neighborhood?
2. Survey shoppers at a shopping center. How many walk to the shopping center? How many drove alone? Do they have a grocery store within walking distance of their home? What do they like about the shopping center? Dislike? Examples: trees, convenience, smells, noise, parking, the goods available, driving to shop, walking to shop, beauty, neighbors the meet, time they save, birds, etc.
3. Secure or draw a map of the shopping center showing streets, types of business, parking lots, areas of garbage disposal, traffic patterns, etc. What percentage of the land has vegetation? What percentage of the land is waterproofed? Compare statistics with the use of the land before the center was developed.

4. Conduct an environmental inventory of the area. Compare micro-climate of the shopping center with other areas, including areas which resemble the former land use of the area. Measure temperatures. *Measure air pollution and winds. Where does rain water go? (Into the storm drains and eventually to a creek.) What washes into the creek with the runoff? (Pollutants such as gasoline, oil, rubber bits, etc.) Investigate problems caused by the automobile. (Traffic congestion, air pollution, water pollution).
5. Obtain a map of Charlotte. Indicate the shopping centers. Investigate the process of city planning as related to shopping centers. Contact the Charlotte-Mecklenburg planning commission. Why are shopping centers placed where they are? Are there regulations controlling design? Aesthetics? Density of buildings? Amount of land which can be waterproofed? Size and type of signs? Landscaping? Find out about zoning regulations. How is the area around your school zoned? Indicate zoning on a map. Could a small grocery store be built in your neighborhood for those who can't or won't drive to shopping centers?

III. VALUES CLARIFICATION

A. Values Voting:

1. How many of you would buy a house on Sharon Amity across from the shopping center?
2. How many of you like to visit a shopping center?
3. How many would like a shopping center nearer your house?
4. How many would like to live in the apartments behind the shopping center?
5. How many would like to own or build a store in the shopping center?
6. How many of you would like to cross Randolph-Sharon Amity intersection at late afternoon?
7. How many would like to ride a bike to the center to buy some bread?

B. Continuum:

1. If you could go to Cotswold Center anytime you choose, where would you place yourself?

   Daily Dick _____ Rarely Rick

2. If you were on the Charlotte Planning Commission and you were asked to vote on a large shopping center for Randolph Road (near ballfields) where would you place yourself?

   Consenting Connie _____ Banning Bonnie

C. Rank Order:

1. If you could choose a store to put in the shopping center, which would you pick?
   a. Service station
   b. Supermarket
   c. Drive-in cleaners
2. If you could get a well paying part-time job cleaning up around a place, what place would you choose?
   a. U. S. Post Office
   b. Harris-Teeter's (grocery)
   c. Hardee's
3. If you were given a large amount of money, where would you put it?
   a. Large downtown bank
   b. Secret hiding place
   c. Branch bank at shopping center
4. If you owned a large wooded area fronting the shopping center, what would you accept for it?
   a. Large amount from company developing center
   b. Medium amount for part of land from apartment developers
   c. Amount offered from park and recreation developers

* Refer to Part E

5. If you had to wait on a ride for about an hour, what place would you choose to meet?
   a. Sharon Amity and Randolph intersection
   b. Beside the A&P Store
   c. Behind Collins Department Store

D. Game:
   1. Man in His Environment, Coca-Cola Bottling Company (available at Environmental Education Center, Charlotte Nature Museum).

E. Kit:
   1. Johnny Horizon Kit (available at Environmental Education Center, Charlotte Nature Museum).

IV. RESOURCES

Books:

Environment and Man, Richard H. Wagner, W.W. Norton & Company, Inc., 1971.
Living with Your Land: A Guide to Conservation for the City's Fringe, John Vasburgh, Scribner, 1968.
The Deligent Destroyers, George Laycock, Ballantine Books, 1971.
Superhighway - Superhoax, Helen Leavitt, Ballantine Books, 1971.

Periodicals:

Breckinfelt, Gurney, "Downtown Has Fled to the Suburbs", Fortune 86:80-87, 156-162, October, 1972.
De Wolf, Rose, "Shopping Centers: Main Street Goes Private", Nation 215:32-35, December 18, 1972.
"How Shopping Malls Are Changing Life in U.S.", U.S. News and World Report 74:43-46, June 18, 1973.

Films:

"Clean Town, USA", Charlotte-Mecklenburg Schools, Hearst Metrotone News, 1971, color, 15 minutes.
"Boomsville", Charlotte-Mecklenburg Schools, National Film Board of Canada, 1969, color, 11 minutes.
"A Nation of Spoilers", Charlotte-Mecklenburg Schools, Alfred Higgins Production, 1964, color, 11 minutes.
"Pandora's Open Top Box", Charlotte-Mecklenburg Schools, U.S. Public Health Service, color, 16 miuntes.
"Bulldozed American", Carousel Films Inc., New York, N.Y.
"Yours Is The Land", Encyclopedia Britannica Educational Corp., Chicago, Illinois.

URBAN SPRAWL: EFFECT ON VEGATATION

Grades 5 and 6

I. INTRODUCTION

Nature is altered most severely in the hearts of our cities. The ground is covered by buildings and pavement, water flows only from faucets and gutters, the sky is gray with pollutants, and plants, if any, are few. Plants in the city are no longer a necessity since food is imported from elsewhere. Urban vegetation has become an artifact of culture reflecting man's desires rather than his needs. But the real value of urban vegetation is not fully understood. What is the worth of a forest in the city? Of an urban vegetable garden? Of a tree house in a vacant lot?

Plysically, plants enhance the city's physical environment in several ways. Vegetation helps cool urban areas. Comparing two plots of land, one a rural field covered with grass and one an urban area covered by acres of concrete, one finds that vegetation greatly affects ground temperatures. The air is cooler both during the day and at night. During the day less heat is absorbed by the vegetated area and during the night the insulating vegetative blanket prevents considerable heat flow from the soil below. Research in New York City has shown that even small green areas have an unexpectedly large beneficial effect on the urban microclimate.

Vegetation also removes both gaseous and particulate pollutants from the atmosphere. Studies in Hyde Park in London reveal that the park's one square mile area reduces smoke concentration by an average of 27 per cent. Coniferous trees are more effective than deciduous trees in filtering particulates, but they are more easily damaged by gaseous pollutants.

Vegetation is important in buffering noise and in providing habitat for wildlife in the city. Vegetation in and around cities can be classified into four categories: (1) trees growing between man's constructions (buildings, streets, etc.) called interstitial forest, (2) parks and green zones existing in blocks or sizeable patches that are relatively unbroken by human constructions, (3) gardens for ornamental plants and sometimes food, and (4) lawns or interstitial grassland.

Interstitial forest characterizes older single-family residential areas. Mass development techniques used in the construction of suburbs since World War II leave suburbs unshaded.

Lawns have become a curious symbol of suburban living. Much energy and water and many minerals are misspent on growing green lawns. Americans spend about $3,000,000,000 annually on the care of lawns. Much of the expensive inorganic fertilizer washes quickly into drains and empties into streams and lakes, often fertilizing the water and stimulating unwarranted algae growth. Extensive useless suburban lawns increase urban sprawl. Well planned parks, similar to those found in Europe might better serve the needs of future neighborhoods.

Man evolved as a creature of the forest and its edges. Perhaps we need to explore more fully the reasons for nature in the city. Plants in the city are a necessity.

II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the conclusion of a successful encounter, the student should be able to:

1. Discuss the purpose of vegetation, environmentally, in the city.
2. Describe the categories of urban vegetation (interstitial forests, parks and green spaces, gardens, and lawns).
3. Discuss the effects of replacing vegetation with buildings and pavement.
4. Draw plans for a residential area, a commercial area, an industrial area and a recreational area which make good use of natural vegetation.
5. Discuss the impact of mass development methods of construction suburbs and shopping centers (the removal of all vegetation before construction begins).
6. Make recommendations to the city planners regarding construction and vegetation policies.

B. Activities:

1. Obtain a map of the area surrounding the school and a map of downtown Charlotte. Indicate areas covered by vegetation. Classify vegetated areas according to use (parks, gardens, etc.).
2. Take a walk around the neighborhood. Visit an area largely covered by vegetation. Observe the vegetation. What problems do you see? Record temperatures four feet above a grassy area and four feet above the pavement. How does vegetation affect water runoff? Measure noise twenty feet from a street which is buffered by vegetation and twenty feet from a street with a comparable amount of traffic which is not buffered. How do trees affect the need for air conditioning which recuires

great amounts of energy?

3. Contact the Air Pollution Commission in Concord. Request information on the ability of plants to filter pollutants, both particulate and gaseous. Request information on the effects of automobile exhaust.
4. Write the city landscape office. Find out how the city controls the cutting of trees on construction sites. How are areas replanted after construction--by the developer, city, or owner? Are green belts planned for Charlotte? Are there regulations regarding landscaping, including trees, in new sub-divisions?
5. Contact the agricultural extension service. Find out what urban conditions affect urban vegetation (air pollution, compacted soil which won't allow air or moisture to be absorbed, root space restricted by buildings and sidewalks, etc.).
6. Build scale models of several sections (residential, commercial, industrial or recreational) of a future city or expanded sections of Charlotte. Show how vegetation could more effectively be used to improve environmental quality.
7. Plan an urban vegetation awareness week. Call attention to the species of trees on the school ground. Publicize the importance of trees in cities. Write to the city landscaping office with suggestions for plantings in your neighborhood. Write the City Council suggesting how other areas of Charlotte could be improved by vegetation.

III. VALUES CLARIFICATION

A. Role Playing:

1. Each student chooses the name of a different plant or animal. He thinks about his choice for three minutes. He then justifies his choice with: "I am _____ (name of plant or animal). I help _____ (justify self or use). I do not want to be _____ because _____." Do not explain the game until the students have chosen names.

B. Continuum:

1. Parsi Paul believes that all life is sacred and no one should kill any living creature. He eats no meat, will not swat a mosquito, and even steps around a cockroach. Experimental Elbert believes that the only way science can move ahead is to experiment on all living things, including people, even if it means death. Where would you place yourself on the line between the two extremes, closer to Parsi Paul or Experimental Elbert? How do you feel about the killing of animals for man's purposes?

IV. RESOURCES

Books:

Science for Today and Tomorrow, Herman and Nina Schneider, D. C. Heath & Company, 1964.
Urbanization and Environment, Detwyler, Marcus and others, Wadsworth Publishing Company, 1972 (for teacher).

Films:

"Force of the Earth", ERB, 17 mm, sound, 12 minutes, color.
"House of Man" Our Changing Environment", ERB, 16 mm, sound, 17 minutes, color.

WOW!! THAT'S DEAFENING

Grades I and 2

I. INTRODUCTION

Sound is made by movement. It can be pleasant or distressing. A sound appealing to one individual may be revolting to another.

The decibel is the unit by which sound is measured and the measuring instrument is a sound-meter (decibel meter). The sound meter registers low, safe, and unsafe readings.

What is an "unsafe" sound? Sounds which are excessive and have an undesirable effect on humans and are called "noise pollution."

Noise pollution can be so intense that it affects living organisms, including humans. (70 dB or higher for one hour or more can be harmful.) It can cause deafness, and it can cause wildlife to move from its natural habitat.

With industrialization and population growth sources of noise pollution are increasing daily.

Machinery, transportation and mass communications systems invade our lives. The results can be deafening!

II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the conclusion of a successful encounter, students should be able to:

1. Distinguish pleasing sounds from noise.
2. Understand that individuals react differently to sounds.
3. Measure noise levels and draw conclusions about the levels of sounds which are unpleasant or injurious.
4. List sources of noise pollution.
5. Make suggestions for controlling noise pollution.

B. Activities:

1. Survey and measure amount of noise in various parts of the school and on the school grounds at different times during the day. Record on a map of the school and school community. Tape sounds in various areas. Identify sources of pleasant sounds. Identify sources of unpleasant noise.
2. Record information collected.

Time	Photo	Measurement of Sound

3. Discuss problems located and suggest possible solutions. Evaluate solutions and rank them from the most effective to the least effective. Prepare a plan to cut down on noise pollution. Share the plan with the school.
4. Noise show and tell: every day for a week listen for noises, especially irritating noises. Sed aside a special time each day to tell about the noises you heard. Tell whether they were pleasant or unpleasant.

III. VALUES CLARIFICATION STRATAGIES

A. Rank Order:

Have the children decide which of the sounds of each group they like the best to hear, next best, and least. Why did you rank them in that order?

Radio	Bell	Scream	Wind	Car
Stereo	Drum	Bang	Rain	Truck
Telephone	Horn	Crash	Snow	Train

B. Values Voting:

Ask the children to make a sound without moving any part of their body. Now ask them to try to make a sound by moving some part of their body. Make a list of the ways you can make sounds. Have the children show by the following activities how they feel about certain sounds. Raised hand indicates that you like the idea. Thumbs down indicate that you do not like the idea. Crossed arms indicates that you have no strong feelings.

Do you like to talk?
Do you like to talk out loud?
Do you like to whisper?
Do you like to snap your fingers?
Do you like to clap your hands?
Do you like to cough?
Do you like to click your tongue?

C. Continuum:
Discuss with the children Noisy Nan who loves music and Quiet Quincy who loves quiet. The teacher would have prepared a large continuum for the floor. The children are to choose where on the continuum they should stand to indicate their feelings.

IV. RESOURCES

Teachers Books:

Program Learning Aid for Introduction to Environmental Science, Phillips W. Foster, Learning Systems Company, 1972.
Noise Pollution, Patrick A. O'Donnel, Charles W. Lavaroni, Addison Wesley Publishing Company, Inc., 1971.
Clarifying Values Through Subject Matter, Merrill Harmen, Howard Kirshenbaum, Sidney E. Simon, Winston Press Inc., 1973.

Pamphlets:

Noise Pollution, U. S. Government Printing Office, August, 1972. U. S. Environmental Protection Agency.
Noise: The Unseen Enemy, M. Barbara Scheibel
Pollution Examining Your Environment, Wentworth, Couchman, MacBean, Stecher.

Book for Children:

The Country Noisy Book, Margaret Wise Brown, Harper Brothers, 1940.

Films:

"Pandora's Easy Open Pop Top Box", 16 mm, 15 minutes, color
"Your Ears", 7 minutes, color, Encyclopedia Britannica
U. S. Public Health Service:
"Noise - Polluting the Environment", 16 mm, 15 minutes
"Noise ", 16 mm, 10 minutes, color

Game:

"The Planet Management Game", Houghton-Mifflin

AESTHETIC AWARENESS OF WATER POLLUTION

Grades 3 and 4

I. INTRODUCTION

There actually is no shortage of water on the earth today. We have exactly the same amount of water today that was on the earth 50, 500, or 50,000 years ago. There is, however, a freshwater wastage, largely as a result of people's abuse of their environment.

As population, industry, and urbanization increase, so does water pollution. This pollution increase is the major factor responsible for water wastage. Nature for many years has been able to cleanse her waterways by natural means, but due to increased misuse and abuse, streams, rivers, ponds, lakes, and the oceans are losing their viability.

North Americans are removing fresh water from underground sources twice as fast as the hydrological cycle can replace it. Europeans three times as fast. At the present rate, Americans will need 700 billion gallons of underground water per year in 1980; only 650 billion will be available.

If our streams are not up-graded locally, it is doubtful if they will ever be productive. Freshwater plants and animals are succumbing to siltation, chemical poisoning and eutrophication. Even though wastewater treatment facilities are being up-graded, it is the small businesses, industries, and individuals that are defouling our local waterways.

Students need to understand that water pollution affects our drinking water supply, recreation, needs of other plants and animals, as well as the aesthetic value.

II. ENVIRONMENTAL ENCOUNTER

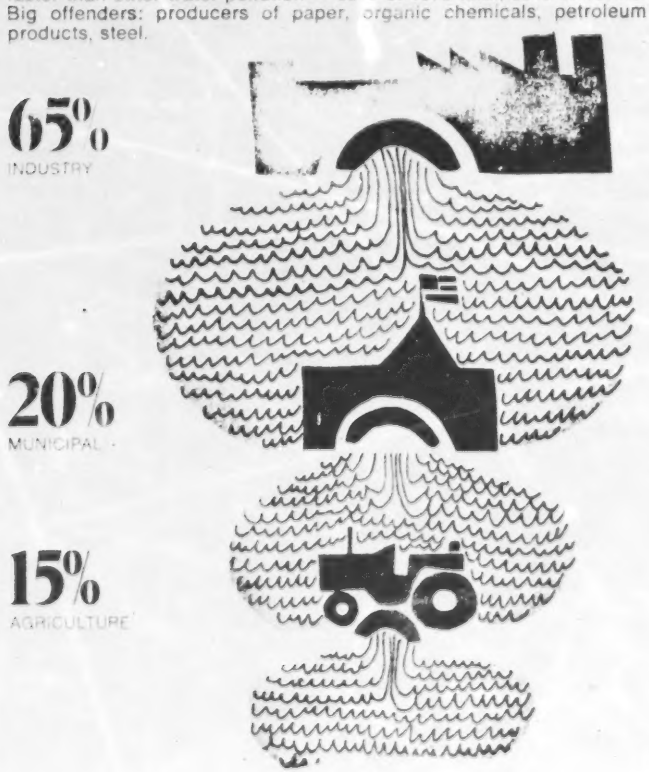
A. Behavioral Objectives:

At the end of a successful encounter, the student should be able to:

1. Name several causes of water pollution.
2. Explain some of the effects of water pollution.
3. Recognize why some of our water is not fit to use.
4. Know what we mean by "polluted" water.
5. Suggest ways to eliminate water pollution.
6. To see how clean water is important to all of us.

The villains

Water-using industries discharge 3 to 4 times more oxygen-demanding waste than entire U.S. sewered population. Industrial waste grows faster than other water pollution — 60% of 1970 total, 65% of 1971's. Big offenders: producers of paper, organic chemicals, petroleum products, steel.



B. Activities:

1. Have pupils collect in a jar some water from different places in community (streams, ponds, puddles, gutters, etc.). Shake up the samples and observe each under a bioscope. Shake up the samples and place a teaspoon of each in separate dishes. Let the samples evaporate, then look at the dishes. What does this show about water pollution? What are some of the causes of the polluted water?
2. Have children collect pictures that show misuse of land and streams and discuss what might be done to prevent this waste. Ask questions: What would you do first to stop the pollution of our rivers, streams, lakes, etc.? What is meant by marshy water? How does it smell? What may cause marshy water to be polluted?
3. If possible, find pictures showing dead fish. What kind of pollution may have killed these fish? Discuss ways to prevent other fish from dying in like manner.
4. Make a list of ways in which our city may be increasing water pollution.
5. Invite someone from our city government to talk with the class about methods used to treat sewage.

III. VALUES CLARIFICATION

A. Values Voting:

1. How many of you like to swim in the ocean?
2. How many of you like to swim in a lake?
3. How many of you like to swim in a public pool?
4. How many of you would choose not to live in a desert where getting water could become a major problem?
5. When you are hot and thirsty on a summer day, how many of you would rather have a drink of cold water than cool-aid?

B. Continuum:

1. Where would you place yourself on this line?

Clean Jean
Clean Jean feels so strongly against the continued practice of polluting our lakes, beaches, streams, etc. that she would rather live on a desert.

Dirty Marty
Dirty Marty is not concerned about pollution so he prefers to play around the polluted water.

IV. RESOURCES

Books for Teacher:

A Guide to the Study of Freshwater Ecology, William A. Andrews, Prentice-Hall, Inc., 1972.

Teacher's Curriculum Guide to Conservation Education: Grades 4, 5, 6, Matthew J. Brennan, J. G. Ferguson Publishing Company, 1968.

Books for Children:

An Introduction to Pollution, Harold E. Schlichting, Jr. and Mary Southworth Schlichting, Steck-Vaught Company, 1972.

Algae, Harold E. Schlichting, Jr. and Mary Southworth Schlichting, Steck-Vaughn Company, 1971.

Ecology: The Study of Environment, Harold E. Schlichting, Jr. and Mary Southworth Schlichting, Steck-Vaughn Company, 1971.

Pamphlet:

Needed: Clean Water, A Scriptographic Booklet, Channing L. Bete, Inc., 1964.

Filmstrips:

"Waste Disposal for the Community", EBF.
"Water for the Community", EBF.
"Wise Use of Water Resources", UNF.
"Let's Explore a Stream", Cor.
"Water and Its Work", McGraw-Hill.

Film:

"The River Must Live", Shell Oil, 16 mm, color, 17½ minutes.

Kit:

"Our Environment: Problem or Promise", A. J. Nystrom and Company, 1972.

WANTED: LOUD OR SOFT

Grades 5 and 6

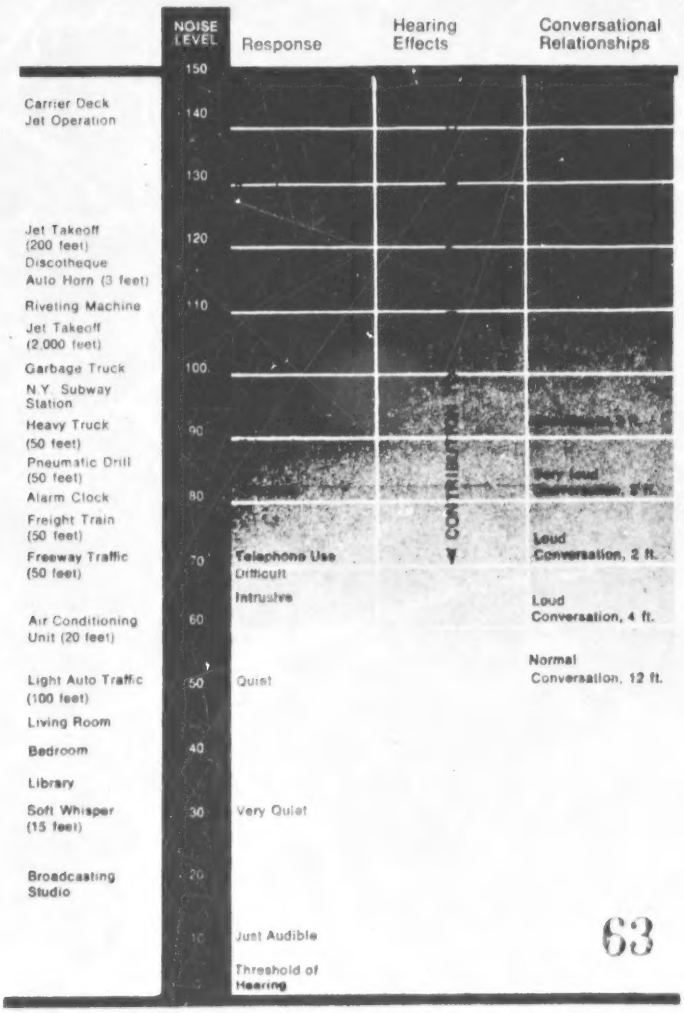
I. INTRODUCTION

Man has relied upon his sense of hearing for information about his environment and social communication throughout time. Density of population, technological development, and urbanization have influenced the amount, quality, and occurrences of sounds which are not always beneficial. Noises are not only annoying distractions but may produce hearing loss, industrial accidents; social problems, job inefficiency, property devaluation, educational interference, and indeterminate plant and animal problems.

Measurement of sound cannot be definite, but the chart reflects studies of average noises on a scale. Sounds from various sources are measured in decibels (dB) as registered by the human ear.

The study and control of noise pollution is relatively new in our country though sound has been studied previously. Since we cannot see the effects, it is difficult to secure control. One way is to reduce the source by more careful design, muffling, or addition of parts to lessen noise. Another is through control of its transmission by insulation or absorption. A third way is through controlling operating procedures as scheduling office machine use, rerouting heavy traffic, or highway designs.

Sound Levels and Human Response



II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

The pupil should be able to:

1. Understand and review vocabulary as sound, noise, intensity, pitch, decibel, acoustics, sonic, ultrasonic.
2. Be aware of the sources of noise inside the school, in a residential area, in a business and/or construction site.
3. Collect and understand data on the effects of noise.
4. Help plan means to control noise pollution.

B. Activities:

1. What is sound? Noise? How is it measured? Inventory the school grounds and the community to determine sources of sound. Secure a floor plan of the building and a map of the surrounding area. Measure sounds in all areas of the school. Use a tape recorder sound level indicator if a sound meter is not available. Measure sounds on the grounds and surrounding community. Make a chart of Sounds and Measurement, recording the data to include: Place, Time, Source, Distance from you, Decibel reading, and How did you act when you heard the sound?
2. How can sound be used and controlled? Discuss methods of reducing noise in each location of sounds measured for chart. Could by-passes and designated truck routes protect residential areas from noise? Do trees and shrubs buffer against noise? Could traffic noise be better controlled from the source and by buff-

ers? Are the laws regulating mufflers on automobiles, motorcycles, minibikes enforced? How are noise abatement laws enforced?

3. Contact the Mecklenburg Building Inspection Office, an architect or a planner. Discuss building codes regarding architectural design and planning. Are there specific requirements for insulation, landscaping, room placement, proximity to other buildings, etc.?
4. If possible, visit an industry or a commercial area. Study machinery noise and its affect on employees. Are ear shields required? Are insulation materials used in walls, ceiling, floors?
5. Collect magazine advertisements on noise producing products. Is noise equated with power? Are there warnings about potential hearing loss?
6. If possible, visit a residential area surrounding the airport. Are residents affected by noise? Are there regulations about building in the airport area?
7. Write the Environmental Protection Agency. Are there laws regulating noise? How are they enforced?
8. Develop a plan to help eliminate noise pollution. Share the plan with others in the school, parents and others who might be interested.

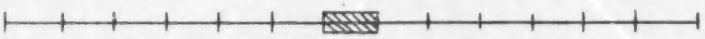
III. VALUES CLARIFICATION

A. Values Voting: (use technique as outlined in introduction for "Valuing the Environment")

1. How many would like to live downtown on Tryon Street?
2. How many would like to play the drums?
3. How many would like to live beside Douglas Airport?
4. How many would like to live on a farm near Matthews?
5. How many would like to live beside I-85?
6. How many would like taking a test on the stage at lunch time?

B. Continuum:

1. If you could play a transistor radio anywhere any time, where would you place yourself?

Forever Fred  Never Ned

2. If you could talk as loud as you desire at lunchtime, where would you place yourself?

Loud Lou Silent Sue

3. If you could choose a vehicle to ride to Monroe, where would you place yourself?

Trailer Truck Tom Cycling Slow Sam

C. Rank Order:

1. If you could choose where to sit at a school band program, where would you sit?
   a. _____ Near the stage
   b. _____ Midway
   c. _____ Back of the room
2. If you could choose a musical instrument to practice for one hour a day, which would you choose?
   a. _____ Violin
   b. _____ Flute
   c. _____ Piano
3. If you could choose a place to live, where would you rather live?
   a. _____ Beside an all night store
   b. _____ Across from a fire station
   c. _____ Next door to a shopping mall

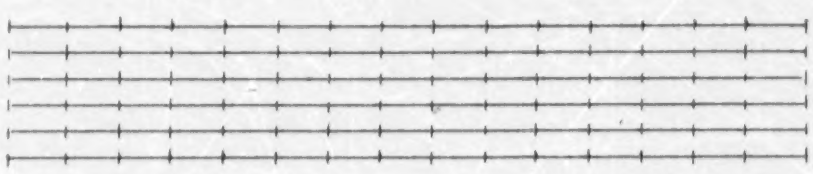
D. Rank Order:

How loud or soft? Rank the following sounds from the softest (1) to the loudest (10).

1. Car horn _____
2. Your home _____
3. Alarm clock _____
4. Library _____
5. Jet takeoff _____
6. A whistle _____
7. Whisper _____
8. Rock/Roll band _____
9. Drilling/Sawing _____
10. Loud radio _____

E. Values Rating Chart:

On large bulletin board paper construct the following chart. Use large tagboard strips and print sounds such as a jet taking off, school library, home, etc. Have the children draw an ear on a piece of construction paper and cut it out. Label it with each name. Place a sound on the top of the chart as it lies on floor or is pinned to a board. Let several children put their "ears" on a line at a time and then tell their reasons why they placed them there.



F. Values Auction:

Here are six items to be sold at auction to the highest bidder. Print money in five and ten dollar denominations. Conduct the auction as would be held in public. Use the following rules to guide you: (1) You have none of these items. (2) You have $100 to spend. (3) You can spend no more than $50 on any one item. (4) Bids must open at $5 and move no more than $10 at a time.

On a separate piece of paper each student should record their highest bid and the top bid for the item.

Items:
1. Love and popularity of friends
2. Minibike
3. Long life with excellent senses
4. Complete stereo with tapes/records
5. A chance to stop sickness and poverty
6. An automobile

IV. RESOURCES

Books:

Clarifying Values Through Subject Matter, Merrill Harmin, Howard Kirschenbaum, Sidney B. Simon, Winston Press, Inc., 1973.
Introduction into Environmental Science, Phillip W. Foster, Roger H. Hermanson, Learning Systems Co. of Richard D. Irwin, Inc., 1972.
Man's Impact on the Environment, Thomas R. Detwyler, McGraw-Hill Co., 1971.
Noise Pollution, Patrick O'Donnell and Charles W. Addison, Wesley Publishing Co., 1971.
Values Clarification: A Handbook of Practical Strategies for Teachers and Students, Sidney Simon, Leland Howe, Howard Kirshenbaum, Hart Publishing Co., 1972.
Science 5, George G. Mallinson and others, Silver Burdett Co., 1968, Chapters 18-20.
The Tyranny of Noise, Robert A. Baron, St. Martin's Press, 1970.
The Fight for Quiet, Theodore Berland, Prentice-Hall, 1971.
Noise and Man, William Burns, Lippincott, 1969.
Sound - From Communication to Noise Pollution, Graham Chedd, Doubleday, 1970.
In Quest of Quiet, Henry Still, Stockpole Books, 1970.

Pamphlets:

"Quiet", U.S. Environmental Protection Agency, Washington, D.C.

Films:

Let's Clear the Air, 16mm., National Medical Audiovisual Center, Film Distribution,

Films contd:

Chamblee, Georgia 30005
Sounds All About Us, 16mm, Coronet Instructional Films, 1954.
Learning About Sound, 16mm, Encyclopedia Britannica Educational Corp., 1955.

Magazines:

"Audubon", The National Audubon Society, 950 Third Avenue, New York, N.Y. 10022, May, 1974.

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